

PORTABLE 100

The magazine for
Model 100 users

MARCH
1984
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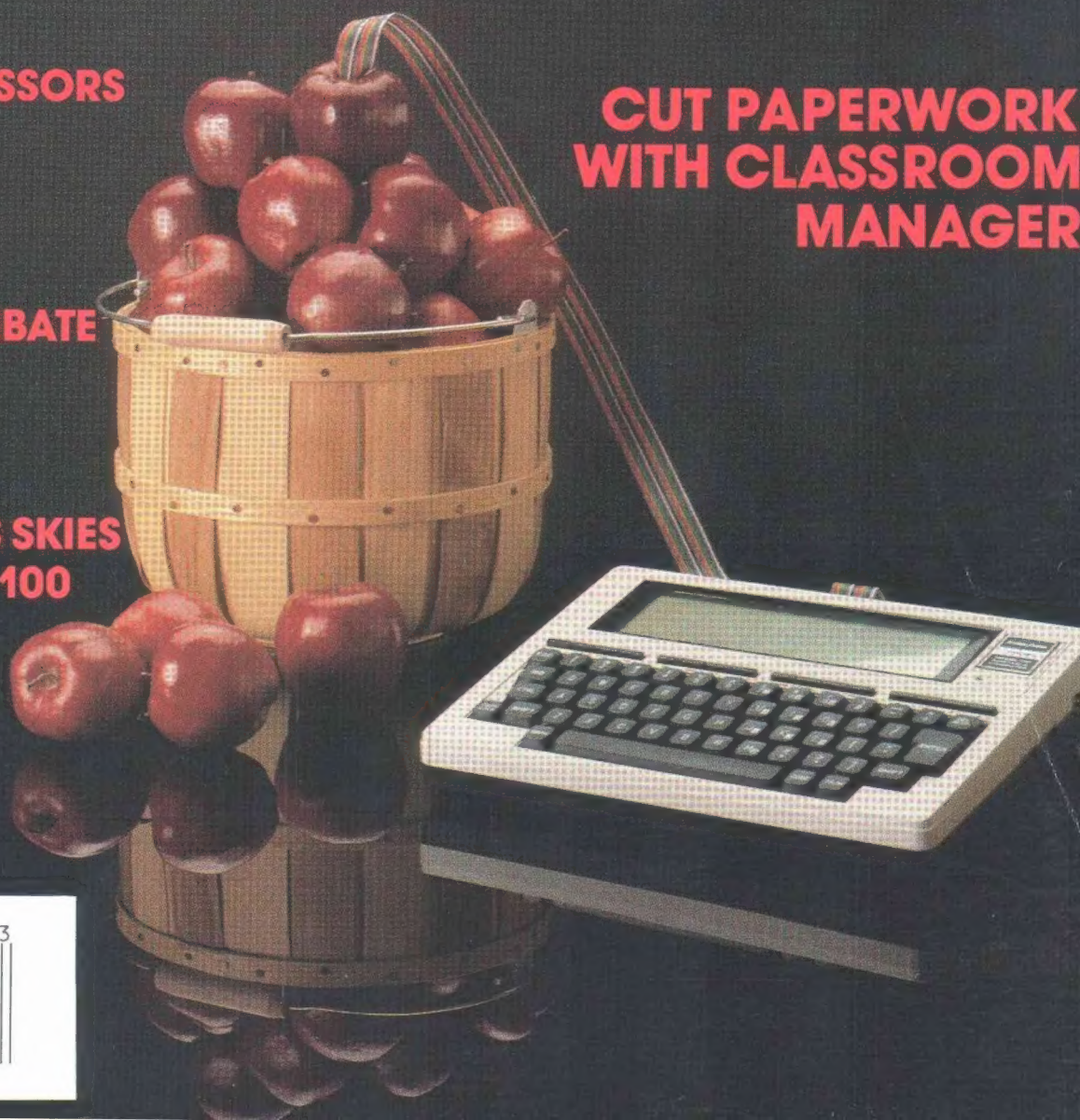
THE APPLE TO 100 CONNECTION

THREE
WORD PROCESSORS
REVIEWED

NUKE ARMS DEBATE
ON SOURCE

UNITED MAKES SKIES
FRIENDLY FOR 100

CUT PAPERWORK
WITH CLASSROOM
MANAGER



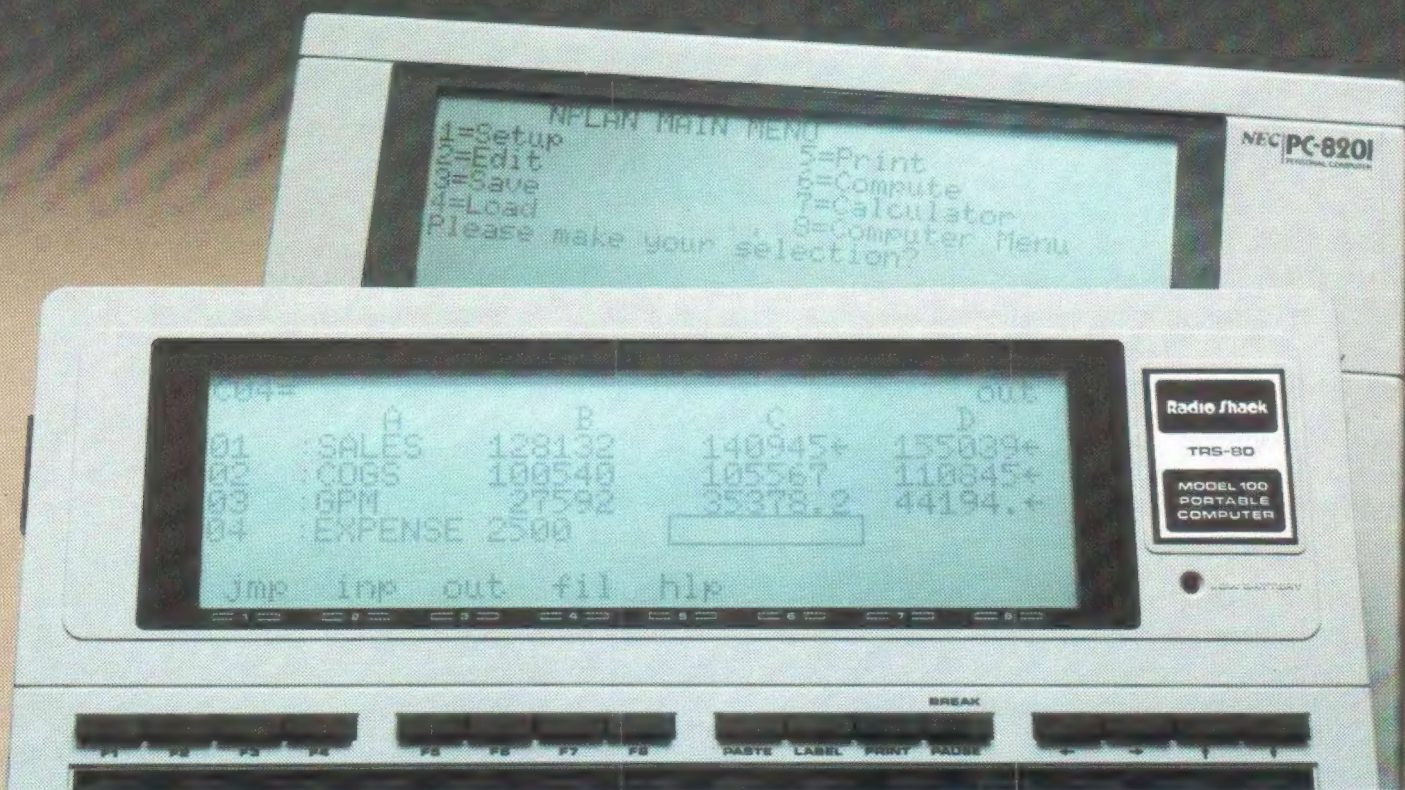
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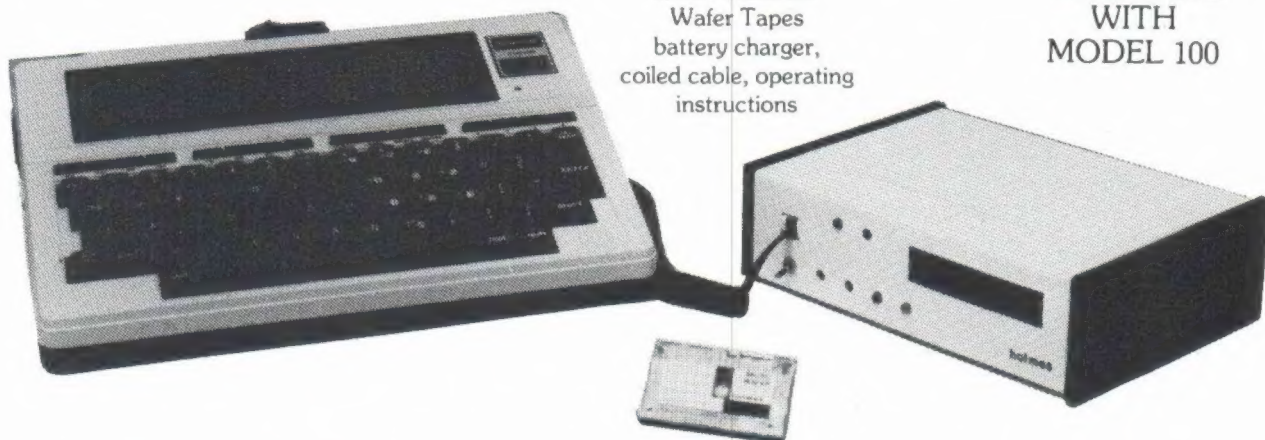
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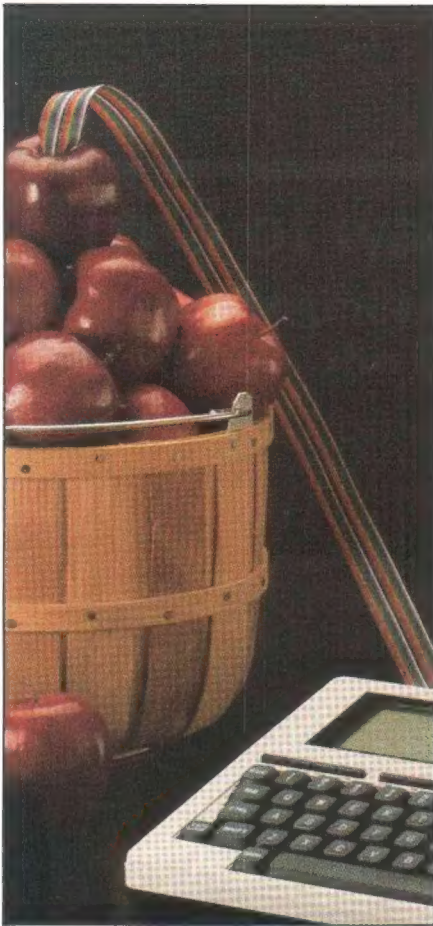
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page 33

FEATURES

33 THE APPLE-100 CONNECTION IS EASY WITH RIGHT HARDWARE By Terry Kepner and Scott Spangenberg

Across the Network Nation, these authors saw a common query: "How do I hook it up to my Apple? Here's their answer.

43 GET OUT FROM BEHIND PAPERWORK DRUGGERY WITH CLASSROOM MANAGER By Jonathan Erickson and Robert J. Sayre

Automating tedious clerical duties can free you for more one-to-one interaction with your students.

ARTICLES

36 TAP INTO THE FREE DATA BASE WITHIN YOUR ROM

By Jesse Bob Overholt

Ever wish you could use schedule and address functions on files other than NOTE.DO and ADRS.DO? Your wish is our command.

56 BENDER'S BETTER WAY TO BETTER BASIC - Part 2

Subroutines can add a professional touch to your programs. Here's how to build a library of them.

By J. Gary Bender

COLUMNS

20 TANDYTALK *Some lessons to be learned from kid tamer and fun-key stuff.* By Bill Walters

24 TELECOMPUTING

*New electronic mail service
started by MCI communica-
tions.*

By Bill Loudon

26 PORTABLE COMMANDER

*The secret lives of Microsilica,
or excuse me, sir, while I
interrupt.*

By Jake Commander

49 BUSCH LEAGUE

*Bid against the computer in this
highbrow art game.*

By David Busch

DEPARTMENTS

- 4 PREVIEW
- 8 MAIL.100
- 14 THE WIRE
- 67 NEW PRODUCTS
- 70 REVIEWS
- 76 FULL DUPLEX
By Terry Kepner

page 43



PORTABLE 100 is published monthly by Computer Communications Inc., 67 Elm St., Camden, ME 04843. James S. Povec—President, Carl Cramer—Vice President.

Subscriptions are \$28 for twelve issues. User Group subscription rates available. Outside U.S.A.: write for further information. Dealer inquiries: Send to P100, 67 Elm St., Camden, ME 04843.

POSTMASTER: Please send changes of address to Portable 100, P.O. Box 250, Camden, ME 04843. Application for mailing at second class rates pending at Camden, Maine, and additional mailing offices.

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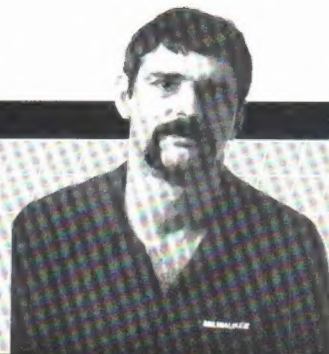
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PREVIEW



ON APPLE-100 COMMUNICATION AND A WORD ABOUT MEWS

Terry Kepner, author of our Full-Duplex column, is well-known in TRS-80 circles through his work on *Color Computer Magazine* and *80 Micro*. But this issue, he's ventured with his friend and Applephile Scott Spangenberg outside the realm of Tandy to experiment with Model 100-Apple relations.

According to Terry, his frequent trips to CompuServe's Model 100 Special Interest group sparked the idea for the article. A common question on the SIG since its inception has been: "How do I connect my 100 to my Apple?" And as a habitue of *The Source*, I can attest the question is a common one there, too.

So when Terry approached me with the idea for the article, I encouraged Scott and him to do it. They tested three Apple boards — CCS7710A, CCS7710D, and The Super Serial board. Their findings start on page 33.

CLASSROOM MANAGER. This month's installment from Jon Erickson and Robert Sayre's book of useful programs for the Model 100 is aimed at teachers (page 43), but tinkerers in Model 100 land will quickly see the program can be modified to do other kinds of data and management chores. For its intended audience, however, the program may be a reason in itself to buy a MEWS.

MEWS? I've used that term freely in these pages, errantly thinking everyone has been following the 100 since its birth. Before the 100 was *the* 100 it was referred to as the "Micro Executive Work Station" (MEWS). When

Tandy released the machine, its ads used both names — the Model 100 and the Micro Executive Work Station. But 100 seems to have won out over MEWS in common usage.

ADRSS-SCHEDL TAP. Jesse Bob Overholt has become a bit of a legend in the early history of the 100. His machine-language programs available in the data bases of the Model 100 SIG are among the most popular there.

To fathom why Jesse has earned the respect of many 100 owners, take a look at his article on page 36. It involves a simple subroutine that can expand any software you write for the 100 by letting you tap the search functions in the 100's schedule and address programs for use in your programs.

MORE BETTER BASIC. Speaking of subroutines, Gary Bender's second installment in his "Better Basic" series (page 56) deals with creating a subroutine library. He's included a "template" to use when setting up a Basic program. A warning: If you type the template in and run it, don't expect it to do anything. It won't! It's just an outline written as a program.

WORD PROCESSORS. As a professional writer-journalist and executive vice president of HomeComputer Software Inc. in Sunnyvale, CA, Dan Shafer does a lot of word processing with his 100. He likes his portable companion, but the minute he laid his hands on it, he knew he needed more

word-processing power than was included in the machine.

Dan says he "taught himself to program computers out of self-defense in the mid-1960s" and was ready to do so again by writing a formatter for his 100, but then he discovered several commercial word-processing programs. What he found out about them begins on page 70.

NUKES. While computing is proliferating, in many people's minds it still carries a "gee-whiz" image, partly the residue of its emergence into popular culture through video games. One activity that may change that image is the discussion of "serious" issues through our "toys." During December, Source Telecomputing Inc. — through its Participate service — made a move in this direction by staging an "electure" on the nuclear arms race. How was the move received? *Portable 100* staffer Nancy Laite tells us on page 14.

KID TAMER. Last November, Bill Walters wrote about using his 100 to entertain one of his children while making a long trip. This idea apparently appealed to many of our readers, because they've been clamoring for the program (which Bill has appropriately called "Kid Tamer"). Take a look at it on page 28.

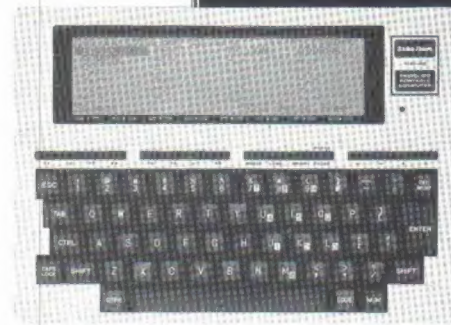
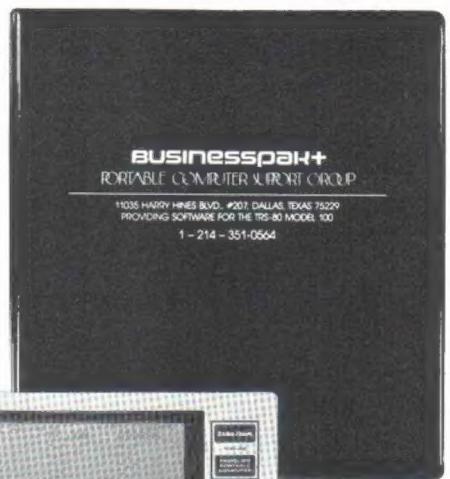
MCI, known as an alternative to Ma Bell for long-distance dialing, has entered the electronic mail business. In his Telecomputing column this month, Bill Loudon (page 24) talks about what it's like to get on the MCI system.

And if you're interested in what all this talk about your Model 100 and interrupts is about, Jake Commander starts the first of a two-part column on *computus interruptus* (page 26). ▀

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**PORTABLE
100** The magazine for
Model 100 users

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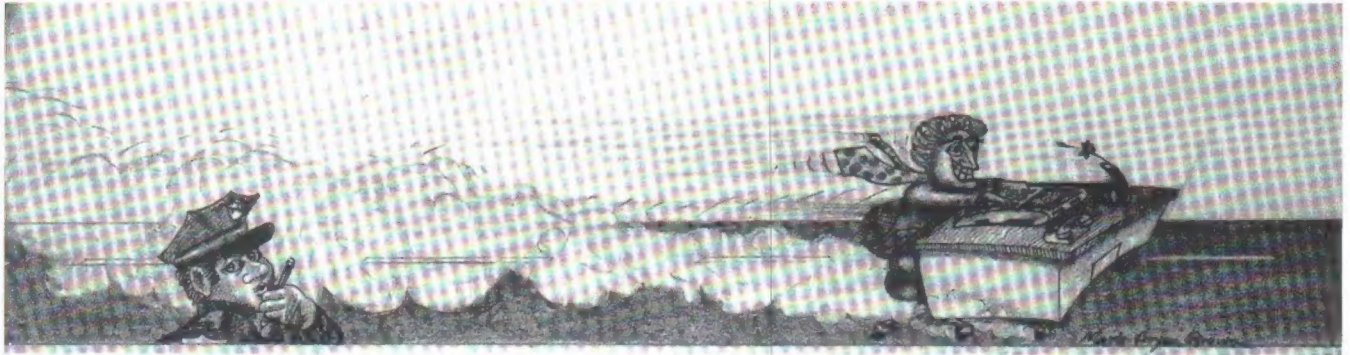
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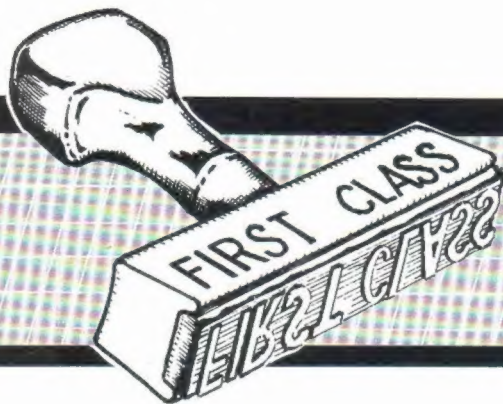
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MAIL 100



Editor's Note: In addition to letters from our readers, we also include in Mail 100 letters from CompuServe and The Source. Those message writers are identified by their CompuServe (CIS ID) or Source (STC ID) identification number.

BUGS UPON BUGS UPON BUGS

I don't know about you guys! Every program I've copied from your magazine has had something wrong with it. Even after I've corrected all the silly mistakes that I've made, they still don't run.

I'm new at this so I originally thought it was all my fault. But when I sent a correction in (see *Portable 100*, December 1983, page 48), you put an equals sign in line 810 that I did not have there.

By the way, I agree with Carrie Arnold's comments on page 8, November 1983 issue. Please don't make it anymore difficult than is necessary for us novices.

K.W. Klages
Orlando, FL

Portable 100 magazine has been a helpful aid in my attempt to master the Model 100. I certainly agree, though, with the complaints about the typeface used for the programs printed in your magazine. They are extremely difficult to decipher and subject to typesetting errors. For example, the short program for the ESC key (page 54, January 1984 issue) had two errors in it. The program should read:

```
10 A$=INKEY$:IF A$="" THEN 10
20 PRINT A$,ASC(A$):GOTO 10
```

One wonders how many mistakes there are in some of the longer programs that would result in hours of tedious debugging. It makes one want

to wait for light pens and bar codes.

Please keep up the good information and helpful suggestions.

Robert L. Briggs
Kensington, CA

READER LENDS HELPFUL PROGRAM FOR TEXT PRINTING

I have been watching the interest in programs to enhance the printing of text that you have discussed in *Portable 100* magazine. This problem also bothered me, so I wrote a Basic program to right justify the printing of text (see program listing 1). This program does not have variable line spacing, or adjustable right margins, but these features could be added very easily.

The program has one requirement that must be observed during text entry. To generate a line feed between paragraphs, a space must precede the line feed generated by the enter key. This program has served me well and was used to print the original copy of this letter.

Your publication has been of great interest to me and can only get better as more people become aware and attached to portable micros.

John C. Hudelson
Eclid, OH

SIGHT PROBLEMS? PROGRAM WILL BLOW YOUR SPECS OFF

We bought our Model 100 (24K) one month ago, choosing it for its portable word-processing capability. We also bought a Radio Shack DMP 120 printer. We have been very pleased with the 100's performance so far, though it needed more flexible printer control to allow paging and special commands. We're also looking forward to the availability of an 80-char-

acter monitor, disk drive, and expanded memory.

One application we intended for the 100 was writing letters and other text to relatives, including my wife's 95-year-old grandfather. He has cataracts which make it hard for him to read, so we thought we could use the dot-matrix printer's bold print option to send him his letters in large type.

Alas, we found that special printer commands cannot be used with the shift-print mode, and, lacking a comprehensive printing program, we were stumped ... until yesterday! That is when I stumbled onto the fact that the printer can be set for a special type-style while in Basic, prior to going to the Text file and activating shift-print. The file will then be printed in the selected type style.

The big advantage is this technique does not bypass the width feature. As long as you set the width for less than the number of the selected characters that will fit on a line, the file will be printed out with lines properly formatted. There are no cut-off words from printer wrap-around and your text looks like text.

Here is a program (listing 2) which uses this technique to select print style for use with the shift-print command. The same thing can be accomplished by typing in the appropriate LPRINT CHR\$() command in the Basic mode, but this is easier.

So stand back, grandad. Here comes a letter you can read without your spectacles.

Jay Chapman, M.D.
Patricia Chapman, M.D.
Newcomb, NY

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Program Listing 1.

```

1 CLEAR 1500
  : DEFSTRS
  : DEFINTN,L,W
2 SR=CHR$(13)
3 DIM SW(250),L(250)
4 SW(0)=" "
10 CLS
  : PRINT
  : PRINT "PRINT PROGRAM WITH
  MARGIN
20 PRINT
  : PRINT "      by John C.
  Hudelson"
30 PRINT
  : PRINT "Enter .DO file to be
  printed."
  : INPUT SF
40 IF SF="END" OR SF="end" THEN MENU
100 LPRINT
110 OPEN SF FOR INPUT AS L
130 NW=NW+2
  : FOR N1=1 TO NW
  : SW(N1)=" "
  : L(N1)=0
  : NEXT
  : NW=0
  : NL=0
  : L(1)=-1
140 NW=NW+1
150 S=INPUT$(1,1)
160 IF EOF(1) THEN GOTO 210
170 IF S=SR THEN GOTO 300
180 SW(NW)=SW(NW)+S
  : L(NW)=L(NW)+1
  : NL=NL+1
190 IF S=" " THEN GOTO 140
200 GOTO 150
210 CLOSE
  : GOTO 10
300 NW=0
  : IF NL>74 THEN GOTO 350
310 NW=NW+1
320 IF L(NW)>0 THEN LPRINT SW(NW);
  : GOTO 310
330 IF SW(NW-1)=" " THEN LPRINT
  : GOTO 130
340 LPRINT CHR$(13);
  : GOTO 130
350 NB=NW+1
  : NL=0
360 NW=NW+1
  : NL=NL+L(NW)
370 IF NL<75 AND L(NW)=0 THEN NW=NB-1
  : GOTO 310
380 IF NL>74 THEN NL=NL-L(NW)
  : NE=NW-1
  : GOTO 390
385 GOTO 360
390 NI=75-NL
  : W=NE-NB
  : WI=0
  : SS=" "
400 IF NI/W>2 THEN WI=2
  : SS=" "
  : GOTO 420
410 IF NI/W>1 THEN WI=1
  : SS=" "
  :
420 LT=(W*WI)+NL
430 FOR NP=NB TO NE
  : LPRINT SW(NP);SS;
440 IF LT<75 THEN LPRINT " ";
  : LT=LT+1
450 NEXT
  : LPRINT
460 NW=NW-1
  : IF SW(NW+1)=" " THEN NW=NW+1
470 GOTO 350

```

Program Listing 2.

```

2 PRINT "Select your print style:"
5 PRINT "      for Bold, type
  'run 20'"
6 PRINT "      for Large, type
  'run 30'"
7 PRINT "      for Dense, type
  'run 40'"
8 PRINT "      type 'run 70'"
10 PRINT "Otherwise print will be
  normal"
11 'Resets type and line feed to
  normal.
12 LPRINT CHR$(27);CHR$(19);CHR$(27);
  CHR$(54);CHR$(27);CHR$(15)
15 GOTO 150
20 'Selects Bold (elongated,
  condensed) type
22 LPRINT CHR$(27);CHR$(14);CHR$(27);
  CHR$(20);
23 PRINT "Bold type selected.
  'Width' must be set less
25 GOTO 100
30 'selects large (elongated) type
32 LPRINT CHR$(27);CHR$(14);
33 PRINT "Large type selected.
  'Width' must be set less
35 GOTO 100
40 'selects dense (condensed) type
42 LPRINT CHR$(27);CHR$(20);
43 PRINT "Dense type selected.
  'Width' must be set less
45 GOTO 100
70 'selects Close Dense type
  (condensed type with 3/4 line
72 LPRINT CHR$(27);CHR$(56);CHR$(27);
  CHR$(20);
73 PRINT "Condensed type with 3/4
  line spacing selected.
75 GOTO 100
100 PRINT "Go to menu and select file"
110 PRINT "Print using 'SHIFT Print'
  command."
150 END

```

Program Listing 3.

```

10 INPUT "Key the side opposite the
  angle and press ENTER.";Q
20 INPUT "Key the side adjacent to
  the angle and press ENTER.";P
30 X=Q/P
  : Y=ATN(X)
40 IF P<0 THEN Y=T+4*ATN(1)
50 PRINT "Correct angle (radians)
  is";Y
99 END

```


with one of the new tapes that look like the large mainframe units, you are really "uptown." If traveling, it is light and only 4.5-inches wide by 7.5-inches long by 1.5-inches thick.

The price for tapes (number 26-308) is a little high, \$3.79, so I only use the recorder to impress someone. Now, if only I could figure out how to make it spin like a mainframe. Oh, well.

Bud Murdock
Irvington, AL

SEARS MODEL 2164 RECORDER AND 100 ARE WINNING COMBO

After reading the article in the December issue about "Clean Heads Key to Cassette Success," I felt it was time for me to disclose some very good news to other Model 100 users.

I have a Sears Model 2165 cassette recorder that I originally purchased for my TI/99-4A home computer and for use on my TRS-80 Model III. I have had absolutely no read/write errors since I have been using it. It works superbly on the Model 100.

There is no worry about where to set the volume either. You set the volume to maximum level and you are all set for care-free data and program storage. I have cleaned it only twice in the year I have owned it.

It sells for about \$49, but I bought mine on sale for about \$29. It cannot be beat.

L. Shepherd
Fredricksburg, VA

WANTED...PROGRAMS FOR RADIO SHACK DIGITIZER

Congratulations on your new magazine. As one of your other readers commented, I also have been waiting for months for good information and programs for the 100. The more I use the 100, the better I like it.

I have a request for your readers. I have a Radio Shack digitizer but only a demo program for it. I would appreciate any programs for it, particularly one that would allow me to trace a drawing. I am not yet proficient enough to write this type of program. Any help would be appreciated. Keep the good articles coming.

Ed Snyder
Holden, MA

D BATTERIES OFFER ALTERNATIVE POWER SOURCE

Your article on alternative power for the Model 100 interested me for I find that on many occasions, I am away from the AC/DC source I normally use. I hesitate to regularly use the built-in batteries since replacements are not always right on hand and frequently I exceed their 20 hour limit. I

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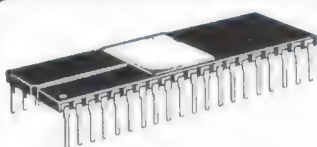
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use the built-ins only for short runs and readings. Hooking up to 6-volt lantern batteries is a good solution but their size and weight present problems not in keeping with the Model 100 portability. Thus, I have compromised and am using 4 D batteries.

These have been placed in a four-cell plastic holder and this in turn is placed in a close-fitting plastic box. These parts are available from Radio Shack.

The battery case is a bit too big for the box but the corners of the holder can be trimmed off with a pocket knife. The fit is so close that one of the positive terminals of the battery case has to be extended with a short machine screw, or similar device to make proper contact. The end result is a plain plastic box about 2-by-3-by-6 inches with a single wire extending from it, ending with a coaxial connector.

I don't have the battery specifications on D batteries but I expect over 100 hours of life, quite ample for my use. The weight is only about 1.5 pounds. I hope this will be helpful to your readers.

Fred W. Forrester
Santa Barbara, CA

CONFUSING POSITIVE SINES WITH NEGATIVES IS BAD TRIG.

The function ATN(X) in Basic assumes that the denominator of the fraction yielding X is always positive, an assumption which is not valid for angles in the second and third quadrants. Therefore, the expressions $Y = \sin(\text{atn}(X))$ and $Y = \cos(\text{atn}(X))$ often evaluate to numbers with the wrong algebraic signs. Beware! That kind of simple-minded trigonometry can put a KAL 747 in the drink.

The error can be avoided by adding PI in appropriate case. And yes, the 100 does know PI. $PI = 4 * \text{ATN}(1)$. Try it. Then try the following program fragment (listing 3), first with a negative value for P and then with a negative value for Q. Note that X is negative in either case. Then try it with two positive values and finally with two negative values. Note that X is positive in both of the last two cases.

If you're doing navigation or astronomy or three-phase electric power problems, don't leave home without it.

A.W. Goldman
Newton, MA

BETTER LATE THAN NEVER IS NOT GOOD ENOUGH

Am I the only one to receive his November issue of *Portable 100* on December 17? I know it's the holiday season, and I know California is a long way away (in lots of ways), but when I sit here one week before Christmas, with my just-delivered magazine, reading about how next month's issue will have an article on Christmas shopping, then I kind of wonder what's up. What's up?

I second those who say you've done a fine job getting the mag up and running. Keep it coming.

Brian Weiss
WORD'SWORTH
Santa Monica, CA

We are sorry your November issue was so late, but you weren't the only one in this situation. Due to a mailing foul-up, our October issue was mailed twice to subscribers — once when it was supposed to be mailed, and once when November should have been mailed. By the time we discovered the problem, December had been mailed. Hence, many subscribers received two Octobers, December, then a November issue.

—Eds.

CUT OUT THE JUNK YOU USE TO FILL UP SPACE!

When, as a semi-novice, I saw all of the jargon in the September issue of *Portable 100*, I decided it wasn't for me. And after picking up a December issue, I still have doubts.

The first article (September, page 18) by Jake Commander was pure drivel, and the second one (September, page 24) was totally irrelevant to me ... as is anything related to ROM addresses, tokens, and machine language! (What percent of your readers try to program in M.L.?)

The column by Leichtman (September, page 64) was trivial, "cutesy," and insulting!

The article by Bowen and Schneider (September, page 48) was stupendous!

Even as a practicing atheist, I found the December (page 24) article by Jake Commander to be dull, tasteless, and sophomoric.

The *only* articles/departments in the December issue that I found to be interesting or useful were those by Norman (page 34), Kepner (page 55), and New Products (page 62).

The brightest spot in the entire December issue was on page 64 where in "Next 100" you mention that J. Gary Bender will be initiating a series on how to be a better programmer. I hope it'll be good enough to compensate for all of the other "junk" you use to fill up space.

Forrest L. Erlandson
E. Lansing, MI

KEEP IT NICE AND SIMPLE SUGGESTS PORTABLE 100 FAN

Not being new to the computer revolution, I would just like to say, first, that your new publication is great for us Model 100 users. Second, I would like to see more programs and articles aimed at the home computer user, which I am.

The main attraction of this computer system is its portability and ease of operation. I have had a few other computers, but this is my favorite and only one at present. I use it to do all of my financial bookkeeping at home as well as for entertainment. It's great to use for programming and also for writing letters.

I also would like to see that the magazine doesn't get as big as the "New York phone book", with unrealistic articles that the average user wouldn't begin to understand, let alone utilize. Keep it nice and simple. I only bring this up because I am a former subscriber to *80-Micro*. That magazine has become so large and arduous that I lost interest and cancelled my subscription.

One more comment before I sign off. Please improve on your photographic techniques when using photographs. The photos on upgrading RAM modules were too dark to see clearly what was suppose to be done. But all in all, your magazine is a welcome sight to us Model 100 lovers. Keep up the good work!

Merrill S. Melnick
Jacksonville, FL

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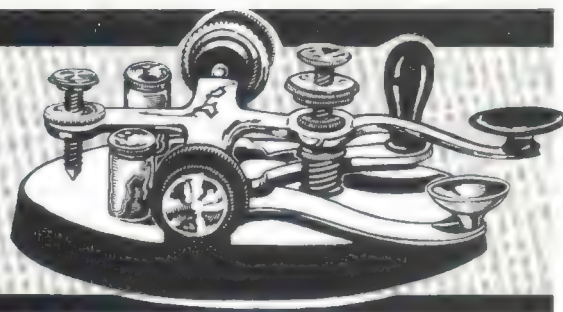
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THE WIRE



THE SOURCE

FIRST ELECTRONIC DEBATE ON NUCLEAR ARMS ISSUE

Nancy L. Laite

While visions of sugar plums danced in many heads this December, a sobering discussion was taking place on The Source.

The Source, a nationwide electronic information service based in Virginia, hosted the first electronic debate on the nuclear arms race, which featured Congressman Edward Markey (D-MA). An outspoken critic of the nation's nuclear

arms policy, the Congressman is the leader of the nuclear weapons freeze movement in Congress.

The 40,000 subscribers to the Source were alerted to the month-long electronic conference by news releases advanced by the information service. Users were then presented with two statements made by Markey: "The U.S.-Soviet Nuclear Balance" and "The Nuclear Freeze, Can It Be For Real?" to stimulate on-line debate.

Following his remarks, the Congressman spurred participants on by asking them five questions:

- Who do you think is ahead in nuclear weapons — the United States or the Soviet Union? On what do you base your assessment?
- Do you think it makes any difference at this point who's ahead?
- Do you think that building more nuclear weapons brings the United States more security?
- The United States and the Soviet Union have been in a nuclear arms race for more than three decades. How would you get both sides to stop?
- Do you think that we can win a nuclear war with the Soviet Union?

Responses to the questions ran the gamut, and interestingly enough, voting analysis, done by debate moderator Irving Lerch, closely paralleled attendees' opinions. According to Ron Klain, a legislative assistant in Markey's office, over 150 joined in the debate.

With 100 voting, over half (51 percent) believe the United States leads the Soviets in the arms race; 10 percent think the Russians have the edge. A substantial 39 percent of the discussants voted that neither was ahead. Judging from the vote, summed up moderator Lerch, it appears "those who think that the United States has the edge... believe in American technological superiority. Thus the majority of voters don't appear to swallow the Reagan Administration's argument that we are exposed to a 'window of vulnerability.'"

The majority (57 percent) sided with Markey on the second question: "...with the huge nuclear stockpiles that both superpowers have accumulated, the question of who's ahead becomes irrelevant... enough is enough...."

Contrary to Markey's thesis, 12 percent voted that building more weapons would bring the United States security.



Congressman Edward Markey

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THE WIRE

As one debator remarked, "Wasn't the reason the Soviets backed down during the Cuban Missile Crisis because the United States was 'ahead' and had a great advantage over the Soviets?" On the other hand, 67 percent voted no, agreeing with Markey; 21 percent were on the fence about the issue.

The optimists of the group strongly felt that "yes, the nuclear race could be stopped." The prevailing solution would be via improved communications between the nations.

The dilemma is "not so much one of parity or superiority, but of stability and consensus on the outcome of any exchange," one participant said. Another remembered, "There once was a joint US-USSR space mission. Scientific (and political) cooperation is possible, no matter how difficult." While a third cited a need for "more attention focused on the similarities between the United States and the USSR, as a prelude to effective communication and eventual understanding."

Ten percent voted they didn't feel there was a way to stop the race. One participant, who signed-on early in the debate, observed: "There is a tendency for military strategists to fight the previous war rather than the next one. WWII impressed both the United States and USSR with the need to build up their arsenals to deter aggressors."

For the appropriately numbered "final" question, attendees were in full accord... a nuclear war would have no winners. Markey's chilling comment was understood by all:

There are now about 50,000 nuclear weapons stockpiled on this planet — with an explosive force of one million Hiroshima bombs, or four tons of TNT-equivalent for every man, woman, and child on earth. No more than 500 of these weapons would destroy every major city in the United States and the Soviet Union.

A spokesman for the Congressman's office reported it was pleased with the turnout for the first electronic public debate, and when asked if Markey might do it again, replied, "love to... but not necessarily on the same subject."

Klain said he believes that electronic conferencing is one of the best ways available for getting political viewpoints from large audiences. "There really aren't that many mediums to reach people with detailed viewpoints — not radio or TV," he said.

The author of "Nuclear Peril: The Politics of Proliferation," Congressman Markey brought his nuclear-freeze resolution before the House of Representatives for a vote in August 1982 and again in May 1983. After being narrowly defeated on his first attempt, the resolution won wide approval on the second (passing 278-to-149). And although a freeze resolution sponsored by Senator Edward Kennedy, also of Massachusetts, was defeated in the Senate, a poll done by Markey's office shows 78 percent of the nation's population in favor of the freeze.

With the success of this first public debate, Participation Systems, the company that designed the software that allows The Source to present such conferences, is planning to schedule future "celebrity lectures." The magnitude of such a novel medium is mind-boggling. As with the advent of TV in the forties, to paraphrase Kain, no one can predict the power that data bases, such as The Source, will exert in the 80s. It's a new forum for public debate, one politicians will be sure to explore.

AIR 100

ONE WIN, ONE LOSS FOR THE MODEL 100

By John P. Mello Jr.

While an airline industry special committee held its first meeting to study potential problems from portable computers operated on commercial aircraft, one airline approved use of the micros on its flights and another banned them.

United Airlines, after performing electronic electromagnetic interference tests on a Model 100, approved the use of "self-powered, typewriter-style, portable computers" on its aircraft.

United's tests of the 100 complemented interference tests performed on the micro by the Ford Aerospace Labs at the request of the Tandy Corporation (*Portable 100*, January 1983, page 13). Those tests concluded the 100 did not exceed interference limits established by the Radio Technical Commission for Aeronautics, an aviation advisory agency comprised of government and aviation industry representatives.

Prior to the Ford tests, Tandy had documented some 140 cases of Model 100s operated by passengers on commercial flights without any interference incidents.

Meanwhile, Eastern Airlines squashed use of micros on its flights. In prohibiting the devices, Eastern said, "It's probably very remote that these things could interfere [with sophisticated aircraft equipment], but we don't know for sure and we've got to know."

In cooling computer use on its flights, Eastern joins PSA, Continental, and Western airlines.

Eastern's ban outraged microcomputing's *vieux terrible*, publisher Wayne Green, who urged a boycott of the airline. In the December issue of *Microcomputing*, Green wrote, "Indeed, as an expert in both radio communications (an old pilot myself) and computers, I've carefully tested my own kneetop computer and found it free from generating interference." He called on his readers to "pass the word....Let's boycott Eastern until it makes its skies friendlier for businessmen."

Green's editorial was among the documents before the Radio Technical Commission's Special Committee 156 when it formally began its study into the portables in flight issue last December.

According to the minutes of the committee's first meeting, Eastern's representative at the session, A. A. Fraga, read several pilot's accounts of interference to airborne equipment allegedly coming from "computing devices" used on the airline's aircraft.

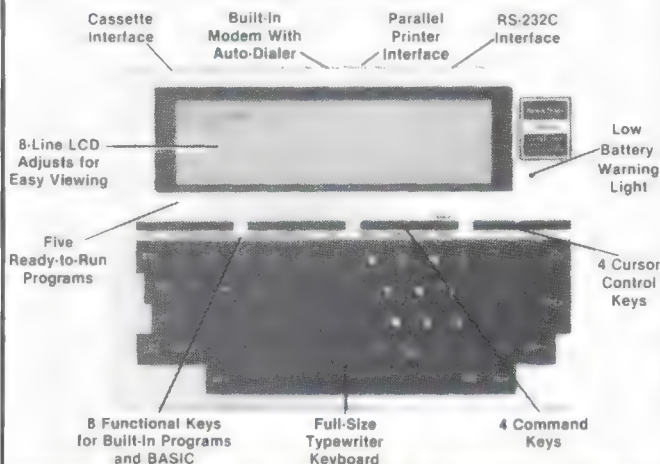
United's representative, D.J. Tangney, however, said he had tested about 20 different units and found they had no detrimental effects on aircraft equipment unless the micros were held in close proximity to the plane's antenna. And since the antenna is located outside the plane, it would be impossible for a passenger to get a computer close to the device while the plane is in flight.

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THE WIRE

MACHINE OF YEAR

MODEL 100 PICKED AS 1983 STANDOUT — AGAIN

InfoWorld, a weekly publication covering the microcomputer industry, has named the Model 100 its "Hardware Product of the Year." *Portable 100* made a similar declaration in its January issue.

InfoWorld cited consumer demand as one of the reasons it chose the 100 for its annual distinction, saying the 100 has been bought up as fast as Radio Shack has been able to manufacture it.

Citing the upshoot of CompuServe's Model 100 Special Interest Group as evidence the 100 is being taken seriously and here to stay, the weekly viewed the 100 as a risk Radio Shack took, a gamble it won, "altering the personal-computer market" forever.

The Model 100's use of a liquid-crystal display, predicts *InfoWorld*, gives the portable a stronghold on the future. "The LCD display was essential to creating a true portable, but until Radio Shack took the risk. It was impossible to predict how an 8-inch, 40-column, liquid-crystal display would be received."

In a related matter, The Seybold Report, a newsletter covering the computer and office automation industries, noted the only other portable coming close to the Model 100 is the NEC PC-8201A. That micro, the report said, has the same Kayocera design (without the built-in modem), but a better keyboard layout. But, it is Radio Shack that holds the trump card. "Tandy's extensive distribution channels," the report noted, will maintain 100's leadership in the field.

TANDY 2000

CLONE MAY OFFER SOLUTION TO PARADOX OF IBM DOMINANCE

COMDEX 1983 was an extravaganza; the platform for introducing desktop micros too numerous to mention (*Portable 100*, February 1983, page 17).

Not many of those machines could be deemed both "interesting and important," according to the Seybold Report on Professional Computing, but one that could was the Tandy 2000 (*Portable 100*, February 1983, page 14), a machine that may take by the horns a dilemma created by IBM.

With IBM's command of the market, the report said, "the result has been that most new software has been written to run on the IBM PC, and most of the new computers have been designed to be compatible with the PC so that they can use this software."

And that raises the question, "How compatible with IBM does a computer have to be?" The report's answer: "the only way of being certain of running any program written for the IBM PC is to emulate all of the characteristics of that machine; not only the processor and operating system, but also the disk format, the characteristics of the display screen, and much of the detailed internal hardware."

But this causes a paradox in computerland... and the new Tandy 2000 might be the only machine, thus far, to change this. The report sees a problem due to the high degree of IBM compatibility other manufacturer's think they need:

"This degree of IBM compatibility makes it difficult for anyone to build a machine which is any better than the IBM PC. If you were setting out now to build a machine which would run MS-DOS-compatible software, you would certainly like to be able to use a more powerful processor (such as the new Intel 80186), a higher resolution display screen, and better disks (perhaps something like the Sony 3.25 units)."

But "as long as a machine remains generically compatible with MS-DOS standards, it should not be difficult for software suppliers to adapt their packages to run on that particular machine. But this is exactly the problem: the more a machine deviates from being an exact clone of the IBM, the more of a chance there is that a given software package will have to be modified to run on that machine. Software vendors are reluctant to make different versions of their programs... and retailers are reluctant to stock special versions" just to accommodate a few. To retailers, the report opined, the guarantee of a big market is essential.

That's where Tandy's new 2000 could be the David that slays Goliath, or at least makes him totter a bit. The report describes the 2000 as the "first of the new-generation higher-performance MS-DOS devices... backed by a sales organization [big enough] to move a lot of machines. This should encourage software companies to make software available for the 2000, and for *machines like it*."

But, the report said, Tandy better clean up its act first, before entering the ring.

It "must shed its cheap, plastic 'Radio Shack' image if it is to be successful in the professional market.... Tandy has certainly paid attention to the outside of the machine. The keyboard has a reasonable layout with legs which let the user adjust the angle. The case is of far better quality than that on previous Radio Shack computers. Equally important, the nameplate on the front says 'Tandy', rather than 'Radio Shack.' In fact, the tackiest part of the 2000 is the nameplate itself — and the fact that Tandy chose to keep the TRS-80 'nation."

Because of Radio Shack's strong marketing dominance in the country, it should entice software companies to adapt their programs for the 2000. "This in turn," continued the report, "should help Tandy lure into its stores the kind of buyer who would be attracted to this machine" — an opportunity Tandy would be smart to exploit. ✓

—Nancy Laite



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TANDYTALK



SOME LESSONS TO BE LEARNED FROM KID TAMER AND FUN-KEY STUFF

It's hard to envision it's almost spring. Everywhere I look I see Christmas decorations and feel the crisp chill signaling winter in Texas.

But March it is and hope springs eternal it will warm up again.

Speaking of warm, the portable computer market has certainly heated up. While at COMDEX, there seemed one of two things to see — either IBM compatible computers or portable computers. Some portables were weighing-in at over 30 pounds ... larger than the suitcase I pack to go skiing!

LET'S MAKE MUSIC. It was during one of my skiing trips I wrote my sound-generating program to keep my son busy (*Portable 100*, November 1983, page 14). Several readers have asked me to share that program with them.

The program is in listing 1. You may want to omit lines 10 and 20 if you're running short on memory. Here's how the little diversion works.

Line 30 clears the screen.

Line 40 checks for a keystroke. Line 50 goes back to line 40 if one hasn't been pressed.

Line 60 converts the character received to its ASCII value. Assuming the control key isn't pressed, that will result in a value of 32 to 127.

Line 70 sets the variable T to 50 times the ASCII code. This multiplier was chosen at random; a larger value will produce lower tones.

Line 80 generates the tone with the sound command. Since the syntax of the command is SOUND <frequency>, <duration>, the value of T produces the pitch of the sound.

I used five, an arbitrary number, for the duration of the tone. A larger value will prolong the note and make the unit fall behind in responding to the subtle banging of little fists, resulting in greater frequency and force of said banging. Increase this value at your own risk!

After execution, line 80 returns to the input-character routine.

Trivial? Yes, but that's one of the joys of owning your own computer. You don't have to justify its use to anyone or anybody.

If that quickie whetted your appetite, I think maybe you'll enjoy this one, too.

FUNCTION KEY FETISH. Function keys have always fascinated me. I first encountered them in the form of simple toggle switches on an IBM 1620 computer. In my eyes, it was the most marvelous piece of machinery I had ever laid my eyes on.

As a freshman electrical engineering major (no, I didn't make it as a double-E major ... but that's another story!) I was in a Fortran course where we *actually got to use a computer*. It was wonderful. It was set aside in its own room with special raised flooring and air conditioning. Best of all, it had 16 *thousand* characters of memory; bytes they called them.

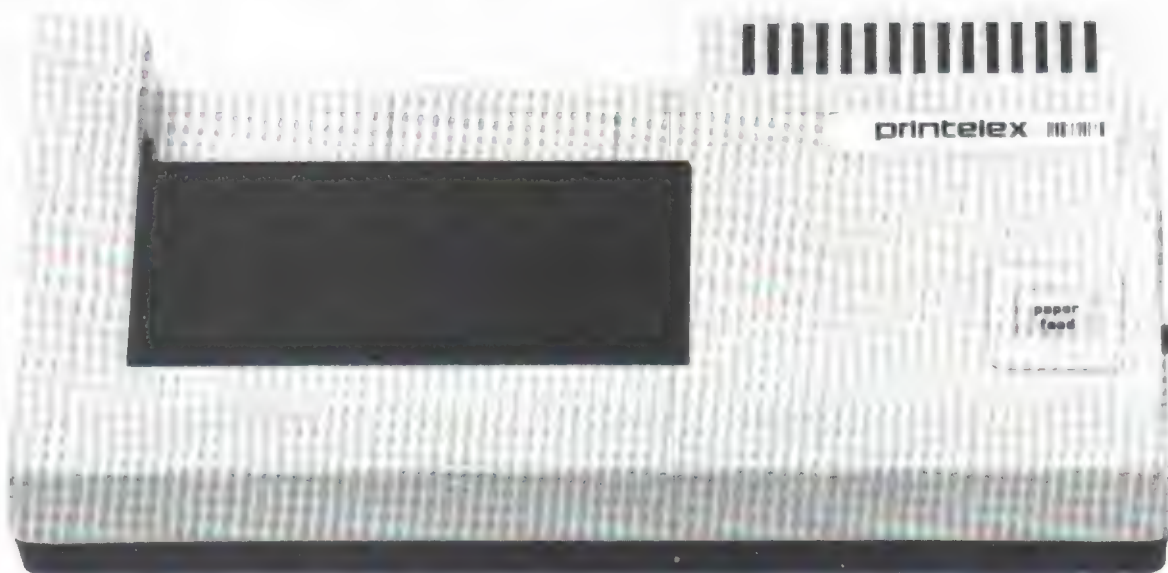
Well, this fortunate writer got to spend hours trying to keypunch programs and load them into the card reader tray. Some of us heretics even said we enjoyed it, despite the dictates of tradition which said: "True engineers enjoyed results, not tools."

LIGHT, SWITCHES, LEVERS. Anyway, this marvelous old 1620 had a row of large, black, plastic, bat-levered switches on the main console beneath rows of flickering neon lights (lights drawing students to the system like moths to a flame) called "Sense Switches."

"Do they make the 1620 make sense of my program?" I naively asked. One of the older hands replied, somewhat above it all, that they were for the computer to sense what position they were in — off or on — and take the appropriate action. Being a persistent



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freshman I asked "Like what?" I'll never forget the reply. "Whatever you want it to do."

That was it. I was hooked. *Imagine*, not only could I write a program where the computer would make calculations and choices, but I could direct it from the console, too!

BRAINS, BEAUTY. Compared to the IBM 1620 I worked with many years ago, the Model 100 is smarter and prettier. It has eight function keys which you can program to do whatever you want.

You can program a key to divert a program and perform another action. This is called an "interrupt," because it interrupts normal processing and goes to some special routine.

Program listing 2 should give you a taste of what the function keys are all about.

FUNCTIONING KEYS. Line 10 clears the screen and forces the labels for the function keys off.

Line 20 prints a title in the center of the screen.

Line 30 sets up variable LB\$, a string of 39 characters for the label line.

Line 40 goes to a common subroutine. It prints LB\$ on the last line of the LCD and suppresses the trailing carriage return.

Line 50 uses an escape code sequence to print in reverse video. CHR\$(27) and "p" start the reverse. CHR\$(27) and "q" reverse it.

Line 60 defines two variables, S\$ (start) and ST\$ (stop) to start and stop reverse printing.

Line 70 directs execution to jump to one of eight subroutines depending on which key is pressed.

Line 80 turns on the function key interrupt capability.

Line 90 prints the time and line 100 cycles back to line 90. This loop continues until a function key is pressed. Then, execution jumps to a subroutine which highlights that function key in reverse.

To exit this program, you must press break to interrupt program execution.

There you have it for this month. I hope these short programs have given you some food for thought. Next month, a peek at something that I hope you'll find exciting. ▼

Program Listing 1

```
10 ' Kid Keeper
20 ' 2/83, Bill Walters
30 CLS
40 A$=INKEY$
50 IF A$="" THEN GOTO 40
60 A=ASC(A$)
70 T=A*50
80 SOUND T,5
90 GOTO 40
```

Program Listing 2

```
0 ' Function Key Example
5 ' 2/83, Bill Walters
10 CLS
: SCREEN 0,0
20 PRINT @10,"Function Key Example"
30 LB$="Key1 Key2 Key3 Key4 Key5
   Key6 Key7 Key8"
40 GOSUB 500
50 PRINT @215,CHR$(27);"p";" Select
   ";CHR$(27);"q";
60 S$=CHR$(27)+"p"
   : ST$=CHR$(27)+"q"
70 ON KEY GOSUB 110,130,150,170,190,
   210,230,250
80 KEY ON
90 PRINT @135,TIMES
100 GOTO 90
110 GOSUB 500
   : PRINT @280,S$;"Key1 ";ST$;
120 RETURN
130 GOSUB 500
   : PRINT @284,S$;" Key2 ";ST$;
140 RETURN
150 GOSUB 500
   : PRINT @289,S$;" Key3 ";ST$;
160 RETURN
170 GOSUB 500
   : PRINT @294,S$;" Key4 ";ST$;
180 RETURN
190 GOSUB 500
   : PRINT @299,S$;" Key5 ";ST$;
200 RETURN
210 GOSUB 500
   : PRINT @304,S$;" Key6 ";ST$;
220 RETURN
230 GOSUB 500
   : PRINT @309,S$;" Key7 ";ST$;
240 RETURN
250 GOSUB 500
   : PRINT @314,S$;" Key8";ST$;
260 RETURN
500 PRINT @280,LB$;
510 RETURN
```


MIKROKOLOR

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The MIKROKOLOR Color Graphics Interface is designed to provide the new TRS-80* Model 100 portable computer with high resolution color graphics and text capability, utilizing a standard color television or color monitor. The MIKROKOLOR provides 256 x 192 color graphics, with 15 colors plus transparent. Its 3 dimensional Sprite planes provide for simultaneous display of all levels. It has four modes of operation available.

1. Test mode: Provides 24 lines of 40 characters each using a 6 x 8 dot matrix, and provides 256 user definable characters.
2. Multicolor mode: Provides 64 x 48 color graphics.
3. Graphics 1 mode: Provides 256 x 192 color graphics, 24 lines of 32 characters each, utilizing an 8 x 8 dot matrix, with 2 colors per character.
4. Graphics 2 mode: Provides the same as Graphics 1 mode, except allows 16 colors per character.

Sprites are prioritized 3-D slide planes, 32 in all, capable of displaying 15 colors plus transparent. This allows easily programmed graphics animation capability for use with business displays, graphs, charts or games. Unit provides Composite Video output for use with any color television when employed with a modulator, or by direct connection to a color monitor. Use with a black & white television or monitor allows 16 gray levels to be used instead of colors. No hardware modification is necessary to your set, as the unit plugs into the existing buss expansion socket. The Texas Instruments TMS9918A Video Display Processor uses no memory from your set, it has it's own on board RAM. Other models supported are S-100, TRS-80 Models I, III, 4 and 12 and Apple II. For information on use with other models, send complete buss information and method of addressing with a large SASE to our technical department, P.O. Box 5686, Vandenberg, California 93437. Bare boards are also available for universal adaptation to almost any 8 bit system.

The Model 100 Mikrokolor will come complete with manual containing sample programs. Also available will be a text translation program that will provide full screen text capabilities of 24 lines of 40 characters a line, with full cursor and scroll functions. VHF Modulators are available also at \$54.00 including cable (powered by Mikrokolor unit). These operate on channels 7-10 VHF.

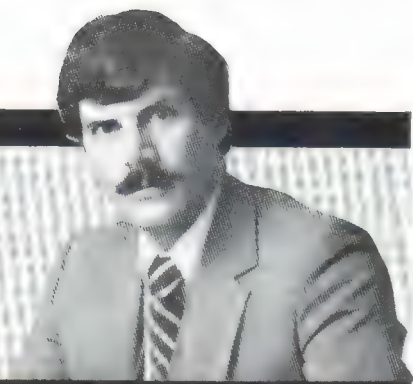
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See cover article to 80 Micro, May '83 for additional info.

*TRS-80 is a trademark of Tandy Corporation.

TELECOMPUTING



NEW ELECTRONIC MAIL SERVICE STARTED BY MCI COMMUNICATIONS

Dow Jones and MCI Communications Corporation recently announced their new electronic mail service. Called MCI Mail, it allows you to send electronic or traditional mail to anyone, anywhere in the continental United States.

Most of the electronic mail products today have no option to send a computer generated message to the "real world". But with MCI Mail, you not only can send electronic messages, but traditional paper messages as well. One of the main drawbacks of other electronic mail services is you cannot send a message to someone who doesn't have a computer or doesn't subscribe to the same information service that you do. However, with MCI Mail, those problems are behind you.

FOUR-HOUR DELIVERY. MCI Mail offers four "classes" of service. The MCI Mail Instant Letter will electronically deliver your message to another Dow Jones/MCI Mail subscriber instantly for \$1.

For \$2, MCI Letter will deliver a laser printed correspondence quality letter via U.S. Mail for next day delivery.

MCI's Overnight Letter will be hand delivered by noon the next business day for \$6.

And for those really pressing messages, MCI Mail offers the \$25 Four-Hour Letter that will be hand delivered to most major cities within four hours.

MCI bases its prices on the first MCI Mail "ounce" which is about 7500 characters or usually 3-5 pages. Additional "ounces" cost \$1.00 each.

But the most unique offering from MCI is its letterhead and signature op-

tion. For an additional \$20 per year, you may store your personal letterhead and register your signature for use with your correspondence.

MCI Mail uses laser technology to print your messages. You may request that your letterhead and signature be laser printed along with your letter. Your letterhead will be printed in black at the top of the first page and a laser image of your signature at the end of your text gives the letter the appearance of a personally typed letter!

SIGN ON. Once connected to Dow Jones (and assigned an MCI Mail address), you simply type //MCI to enter MCI Mail.

MCI organizes its electronic mail as you might organize your office correspondence. There's an "INBOX" for the letters you have received but have not yet read; an "OUTBOX" for the messages sent to others; a "DRAFT" for a message begun but not yet completed; and the "DESK" where your messages are actually read.

When you read a message, it moves from the INBOX to your DESK. You may read a message on your DESK and respond or act upon it later. The OUTBOX will hold your personal copies of the messages that you send to others. In fact you can look at your

OUTBOX to see to whom you have sent messages and when.

Once you enter //MCI from Dow Jones, you will be asked:

Please enter your user name:
BLOUDEN
Password: (password will not print)

You will then see:

Welcome to MCI Mail!
Your INBOX has 2 messages (1 PRIORITY, 1 RECEIPT)

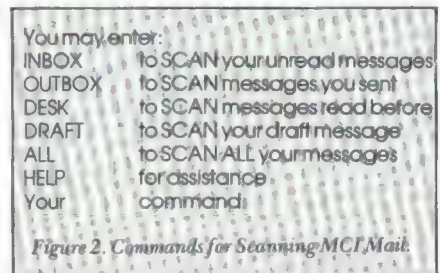
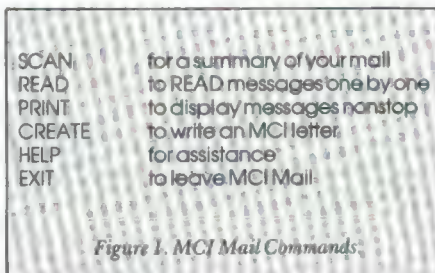
At this point you will receive the menu of options in figure 1.

SCAN, READ and PRINT are the commands that allow you to search or display any messages in your mailbox. If you wished to SCAN your messages, you would see the screen in figure 2. Entering INBOX might reveal a screen as in figure 3.

After the messages are scanned, you will have the options in figure 4. If you choose the READ option, you may read the messages one by one; and after each message you will have the option to compose an immediate reply.

To compose a message on MCI Mail, you simply use ANSWER. The answer command will automatically build and display the "envelope" for you. It will be addressed to the sender of the original message, and the subject of your reply shows the original subject of the message you are answering. If you chose to ANSWER EACH, then the envelope would also display the other recipients of the original message as well.

Once the envelope is created and



displayed, you will be prompted:
Once the envelope is created and displayed, you will be prompted:

Text: (Type / on a line by itself to end)

You enter your message as you would on a typewriter. When you are finished, type /-<enter> at the beginning of the last line to end your message.

You will then see the screen in figure 5.

By entering SEND after your message was composed you would receive the posting information:

Your message was posted:
Tue Feb 14, 1984 11:19 AM EST There is a copy in your OUTBOX

To CREATE a message from the main MCI Mail menu, you would be prompted for TO:. You may enter the person's name such as BLOUDEN or the MCI Mail ID number (in my case 131-2199).

If you entered the name, MCI Mail will automatically search its records for a match. If more than one match is found, a list displaying the full name, company, and location will be displayed with the respective MCI Mail ID numbers for your selection.

If MCI Mail does not find the addressee, you will be prompted (Please enter address:) You may then enter five lines of postal information to have your letter delivered.

MCI Mail is an easy, convenient and powerful new electronic mail service that offers the ability to send electronic mail back into the "real world." But it is also more expensive than the two major alternatives on CompuServe or The Source. Its value added services of letterhead storage and signature registration, though, may make it the only alternative for some.

MCI and Dow Jones should be congratulated on an excellent electronic mail product which will undoubtedly set the standards for electronic mail products of the future.

If you would like more information on MCI Mail, call MCI Customer Service at 800-424-6677 (in Washington, DC, call 833-8484).

Bill Loudon is the product manager for personal computer services for the CompuServe Information Service. He sponsors the Model 100 SIG on CIS.

No.	Posted	From	Subject	Size
1	FEB 12 12:20	John Gilbney	Contract Due	512
2	FEB 16 14:21	Julie Graber	PRIORITY Weekly Report	2134

Figure 3. Contents of MCI Mail Box.

READ	to READ the scanned messages
PRINT	to display messages nonstop
SCAN	to SCAN for other messages
HELP	for assistance

Figure 4. Options Following Scan.

You may enter:	
READ	to READ your reply
EDIT	to EDIT your reply
SEND	U.S. Mail for paper; instant electronic delivery
SEND ONITE	OVERNIGHT courier for paper; PRIORITY electronic delivery
SEND 4HOUR	FOUR-HOUR courier for paper; PRIORITY electronic delivery
NEXT	to go to the NEXT message
HELP	for assistance

Figure 5. Sending your MCI Mail.

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PORTABLE COMMANDER



THE SECRET LIVES OF MICROSILICA OR EXCUSE ME, SIR, WHILE I INTERRUPT

This month I'm going to take a peek into the world of interrupts. When I began their description, I had a notion of giving a general overview of what they are, how they apply to the 8085 microprocessor, and what each type does in the Model 100. I soon realized, however, that was going to be an impossible task in a single column. So, I'm going to split up the subject into the how, why, and what.

Interrupts generally are regarded as mysterious, complicated events which occur behind the back of the programmer's normal code. While this helps to maintain their mystique, it also explains references to "foreground" and "background" tasks accomplished by computers (micro or mainframe).

I've seen the word "foreground" applied to both the normal code and the interrupt-handling code. This is because interrupts generally are executed with a higher priority than normal code and so could be considered to be foreground tasks. I find this uncomfortable and prefer to go with the more intuitive notion of normal code being in the foreground and interrupts executing in the dark shadows of the background.

UNRAVELING THE MYSTIQUE. This all adds to the confusion and mystery attributed to interrupts. Really all you have to do is ascertain which-way-around a particular author is thinking when referring to these terms.

To reiterate: When I use "foreground," I mean the main-line code; I use "background" to refer to code executed as the result of an interrupt. I'm not arrogantly claiming to be right, just arrogantly claiming that the

others are wrong!

But this is getting ahead of ourselves. To take a first peek at interrupts, let's focus a microscope into the midst of a computer's workings, where something immediately becomes clear. Sitting comfortably? Then we'll begin.

MICROSILICA. In the tiny world of Microsilica, life is extremely busy. It's always rush hour (although such a thing as a traffic jam has never been known). The pace never slows down. An incessant dialog has been going on for minutes and minutes—eons in Microsilica terms. Zooming into a ROM location we can see what's happening.

The microprocessor came this way under the program's directions only a few thousand instructions ago. Let's wait... there's every chance it'll return. But get ready to hang on tight to its coat tails; it goes extremely fast.

Right! Brace yourself; it looks very much like he's headed this way. Hold tight... get that number over there!

EAVESDROPPING. "Oh yes, that number six."

"Now subtract that number there!"

"OK, that leaves two."

"So store the result in location 21,345!"

"Certainly."

"Now multiply by two! And again! Now add that number from location 21,345!"

"Yes, yes. Into location 21,345. What's the next instr..."

"Exc-yoose me! Hey! Over here!"

"What do you want? Can't you see I'm busy? Who are you?"

"I'm the clock."

"Big Deal. I'm the microprocessor. So what can I do for you?"

"Well, I was designed to tick every four milliseconds and I just ticked. I guess I need servicing."

"Oh boy. Didn't we go through all this four milliseconds ago? Let me just make a note of where I was..."

COMPUTUS INTERRUPTUS. What we just witnessed was computus interruptus. Apart from displaying how lucky we are that the hardware doesn't speak, we do get some idea of how the microprocessor (MPU) has to react to an interrupt. Whenever you use your Model 100, the hardware equivalent of that voice kicks the 80C85 MPU and stops it in its tracks for quite a few millionths of a second. Why the heck would the designer of a computer want this to happen?

In the case of the interrupt witnessed above, there just isn't any alternative. If the computer system as a whole is to have a realistic idea of the time, then an up-to-date note must be kept of it. The only way to do this is to update it at regular accurate intervals. Hence, the storyline above would have continued at a point with the clock in the Model 100 being read and stored somewhere. Then, if later the MPU happened to be plowing through the TIME\$ code in Basic, a valid time could be ascertained. Without an interrupt occurring at a predetermined interval (sometimes referred to as the heartbeat interrupt), there would be no guarantee that the internally stored time was reliable.

The best way for someone to grasp why an interrupt can succeed without upsetting anything is to envision the event as a hardware-generated subroutine. So while the MPU is executing machine code at millions of instructions per second, a voltage pulse, representing an interrupt, can enter the MPU via one of its 40 pins and stop it temporarily in its tracks. It's then forced to go somewhere else in the code.

The only way this differs from a

GOSUB in Basic or a CALL in machine code is it is a hardware rather than a software method of entering a subroutine. But the effect is precisely the same: The code being executed is temporarily put aside; the new code takes over.

PROGRAMMER'S JOB. You might have gotten the idea that this could cause an unintended catastrophic change in the intended flow of a program. You've suddenly shot from foreground to background without so much as a by-your-leave. How's the foreground program ever going to regain proper control? In fact, a fiasco would be the result if the programmer who deals with the interrupt didn't fulfill his obligations.

The only help the hardware gives during an interrupt is to save the contents of the program counter in memory — usually on the stack. The program counter contains the location of the instruction that would have been executed next, if the interrupt had not occurred. From that point on, it's up to the programmer who writes the interrupt-handling code to ensure that

when he's finished, the MPU is restored to exactly the same state as it was when it was interrupted.

So, if he uses any MPU registers (and he's almost bound to), they will have to be preserved first, along with the program counter, and finally restored before returning to the main code that was interrupted.

POLLING WITH INTERRUPTS. Another reason for using interrupts is to save us from polling external devices. This is what happens when a section of code scans to see if anything such as a keyboard is inputting a character. Many computers (but interestingly not the Model 100) generate an interrupt when a key is pressed. Thus, the foreground program stops, the key is read and stored somewhere, and the foreground program takes over again. Theoretically, this method can never miss a keypress.

The other method is called polling, and doesn't use an interrupt to indicate a keypress. What happens here is that the foreground program checks the keyboard at strategic points in the code, sees if a key is being pressed, and

acts accordingly. But what if the code gets extremely busy and doesn't get a chance to look at the keyboard? Simple. The keystroke gets missed. To witness that effect, try pressing the break key on a Model I during Basic's garbage-collection routine.

Another example of external information that can be missed, unless signaled by an interrupt, is serial input from a modem. When a character comes in at 1200 baud, it probably won't be long before it will be followed by another. Unless there is some form of handshaking, the sending computer will duly transmit a new character as soon as it's ready. If it sends faster than the receiving-end can poll the RS232 input, characters will be missed. If serial input caused an interrupt to be generated after each character was received, there would be no reason why every character couldn't be accommodated.

Clearly, there are times when interrupts are the best programming solution to a problem. Next month I'll look at the various methods open to the 80C85 in dealing with them. ▽

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BUSCH LEAGUE



BID AGAINST THE COMPUTER IN THIS HIGH BROW ART GAME

Editor's Note: Dave's column is based on his 25 Games for Your Model 100 published by Tab Books of Blue Ridge Summit, PA 17214.

Have you ever felt that you were at the mercy of a random universe? If so, you will like "Art Auction." You buy paintings and bid against an opponent who bids randomly. Then, you may sell your paintings, but all the offers will be random amounts, and even the number of offers are decided at random. Is that lacking in causality enough for you?

The player will start off with \$5000, and will be offered five different paintings. The object is to accumulate as many paintings as possible, at the lowest price possible. After you submit your bid, the computer will make a bid. If yours is higher, you get the painting. If your bid is a lot higher, you still get the art work, but you get the sick feeling of having spent too much money. This is like real auctions in many ways.

SELL AT PROFIT. In the second round of play, you will be offered one or more bids on your art. Some may be more than what you paid, some may be lower. If you refuse a bid, and it turns out to be the last one, you are stuck with the painting. The object is to finish the game with more money than you started with. So buying many paintings and selling them all for a profit is desirable.

Your BID, which cannot be greater than your CASH, is entered in line 290. The opposing bid is randomly selected. A random number from 1 to

99 is chosen by the computer, multiplied by 10, and added to 150. So, the lowest bid the computer is likely to make will be \$160. The highest it can bid is \$1140. Knowing these facts will likely spoil the game for you, so forget you read them.

The amount you paid for a painting is stored in COLLECT(n), and your

CASH reduced each time you acquire a fine work of art.

In the second portion of the game, you are offered a number of bids — from one to seven — determined by a random number, OF, selected in line 510. Then, a For-Next loop from 1 to OF bids anywhere from \$600 to \$2500 for your paintings. It's up to you to accept or reject an offer. Strategy: Anything over \$2000 should be snapped up. Also, don't pay more than \$2500 for a painting; you'll never get your investment back. ▼

VARIABLES USED IN ART AUCTION

AS	Used in INKEY\$ loop
BID	Amount bid for painting
CASH	Player's cash remaining
COLLECT(n)	Prices paid for up to five paintings
DU	Dummy variable for RND(1)
FS	PRINT USING format
N	Loop counter
N2	Loop counter
OF	Number of offers to be made
OP	Opponent's bid

```

10 ' *****
20 ' *
30 ' * Art Auction *
40 ' *
50 ' *****
55 ' *** Set Random Start Point ***
60 FOR N=1 TO VAL(RIGHT$(TIME$,2))
70 DU=RND(1)
80 NEXT N

85 ' *** Instructions ***
90 CLS
   : PRINT
   : PRINT
100 PRINT TAB(12)"Instructions?"

```


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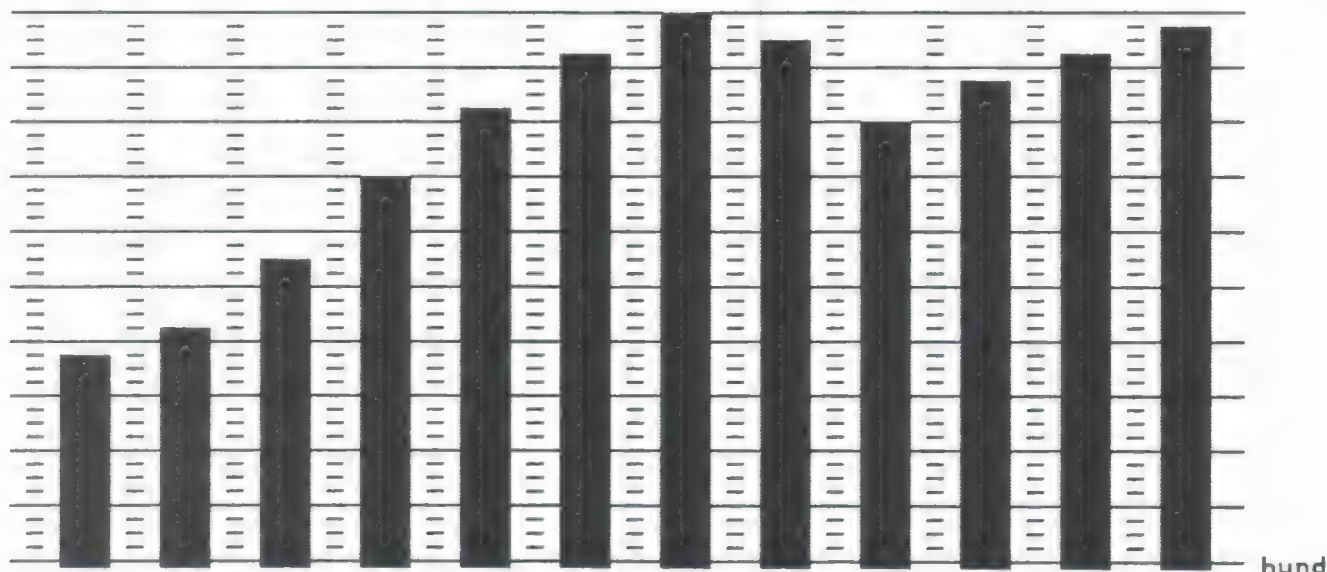
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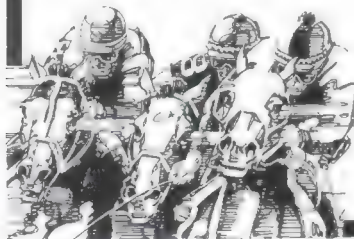
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BUSCH

```

110 PRINT
    : PRINT TAB(16)"(Y/N)"
120 AS=INKEY$
    : IF AS=""GOTO 120

130 IF AS="Y". OR AS="Y"GOTO 140
    ELSE GOTO 120
140 CLS
    : PRINT

150 PRINT TAB(7)"You will get to buy
    up"
160 PRINT TAB(7)"to five paintings.
    Then"
170 PRINT TAB(7)"they will be
    auctioned."
180 PRINT TAB(7)"Number of offers
    will vary."

190 PRINT
    : PRINT TAB(9)"== Hit any key ==
    "
200 AS=INKEY$
    : IF AS=""GOTO 200
210 C AS H=5000
220 FS="$####.##"

225 " *** Buy Paintings ***
230 FOR N=1 TO 5
240 CLS
    : PRINT

250 PRINT TAB(2)"Cash left :";USING
    FS;C AS H
260 PRINT TAB(2)"Painting number ";N;
    " is now"
270 PRINT TAB(2)"up for sale. Enter
    your bid"
280 PRINT TAB(4);

290 INPUT BID$
300 BID=VAL(BID$)
310 IF BID>C AS HGOTO 240
320 OP=INT(RND(1)*100)*10+150
330 PRINT TAB(2)"Opponent bid ";
340 PRINT USING FS;OP

350 IF BID=>OPGOTO 380
360 PRINT TAB(2)"You lost that one!"
370 GOTO 420
380 PRINT TAB(2)"You bought that one!"

390 NU=NU+1
400 COLLECT(NU)=BID
410 C AS H=C AS H-BID
420 PRINT TAB(2)"== Hit any key ==";
430 AS=INKEY$
    : IF AS=""GOTO 420
440 NEXT N
  
```


BUSCH

```

445 ' *** Sell Paintings ***
450 FOR N=1 TO NU
460 CLS
    : PRINT

470 PRINT TAB(2)"Your painting #";N;
    "now for"
480 PRINT TAB(2)"sale: You paid ";
490 PRINT USING F$;COLLECT(N);
500 PRINT TAB(2)". "
510 OF=INT(RND(1)*6)+1

520 FOR N2=1 TO OF
530 BID=INT(RND(1)*200)*10+500
540 PRINT TAB(2)"Bid ";
550 PRINT USING F$;BID

560 PRINT
    : PRINT TAB(2)"Accept {Y/N}"
570 A$=INKEY$
    : IF A$="" GOTO 570
580 IF A$="Y" OR A$="y" GOTO 590
    ELSE GOTO 610
590 C AS H=C AS H+BID
600 GOTO 670
610 NEXT N2

615 ' *** Too late! ***
620 CLS
    : PRINT
630 PRINT TAB(2)"Sorry, last offer!"
640 PRINT TAB(2)"You're stuck with
    it!"
650 PRINT
    : PRINT TAB(10)"== Hit any key ==
    "
660 A$=INKEY$
    : IF A$="" GOTO 660
670 NEXT N

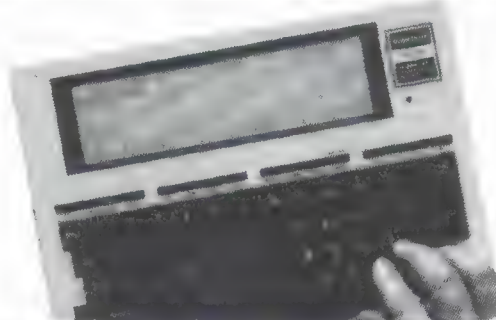
675 ' *** End of Game ***
680 CLS
    : PRINT
690 PRINT TAB(2)"You started with
    $5000"
700 PRINT TAB(2)"And finish with ";
710 PRINT USING F$;C AS H
720 IF C AS H<5000 THEN PRINT
    : PRINT "Sorry about that!"
    : GOTO 740
740 PRINT
    : PRINT TAB(10)"Another game?"

750 A$=INKEY$
    : IF A$="" GOTO 750
760 IF A$="Y" OR A$="y" THEN RUN
770 CLS
780 END

```

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THE APPLE-100 CONNECTION IS EASY WITH RIGHT HARDWARE

Across the Network Nation, these authors saw a common query: "How do I hook it up to my Apple?" Here's their answer.

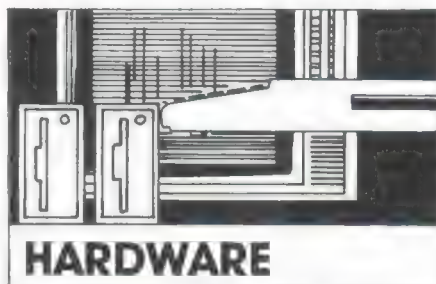
By TERRY KEPNER and SCOTT SPANGENBERG

As a member of the Compu-Serve Model 100 Special Interest Group, I've noticed one of the most frequently asked questions (outside of "How do I use the SIG data base?") is: "How do I get my Model 100 to connect to my Apple II computer?"

Since a friend of mine, Scott Spangenberg, has had an Apple computer for three years, I thought it might be interesting for the two of us to combine our talents and do a little research on the subject.

The first thing Scott told me was there are about a dozen different hardware cards that give the Apple II RS232 communications capability. Fortunately, all these cards operate using one of two configurations: data terminal or data communications.

The data terminal arrangement assumes your Apple II is connected to some type of terminal device, such as a teletype or RS232 printer. The data communication boards assume the Apple II is connected to a modem, for communication via telephone lines to another computer.



AT YOUR CONVENIENCE. Armed with these two facts, the choice of which board to buy is a matter of your convenience and which capabilities you want to add to your computer.

One of the conveniences to consider is whether or not you want to use a "null modem" to connect between your Apple II and the Model 100. If you buy a data communications RS232 board for your Apple, you'll need the "null modem" between the two computers. This is because each computer is expecting to receive data on data line three, and to send it out on data line two (modems transmit data on line three and receive it on line two).

So, to get the two computers talking directly to each other, you have to

switch the data lines across so that what is sent out on data line two on one computer goes to data line three of the other, and vice versa (other lines also have to be crossed). For more information, see "Build Your Own Null Modem," *Portable 100*, September 1983, page 38.

If you don't want to use a null modem every time you connect your two computers, get the data terminal type RS232 board for your Apple, which sends on data line three and receives on line two. This lets you use just a straight cable from the Apple to the Model 100, which sends on line two and receives on line three.

GETTING STRAIGHT. To make a straight cable is easy. Buy two male DB-25 subminiature connectors, and a section of 25 conductor ribbon cable. All three can be purchased from Radio Shack: part number #276-1559 for the DB-25 connectors, and #278-772 for five feet of ribbon cable. Total cost is \$13.57, not including tax.

To make the cable, lay the ribbon on the connector barbs, put the retainer over the cable, and use a vice-grip to slowly and evenly press the cable onto the barbs. Make sure you match-up pin 1 of one connector to pin 1 of the other. Next, use a volt-ohmmeter to test the electrical connections between the connectors.

If you don't think you can do it yourself, you can buy a male-to-male cable from most computer stores (but not Radio Shack) for around \$19.95.





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THE NITTY-GRITTY. Scott and I ended up testing three of the Apple RS232 boards with the Apple IIE: the CCS-7710A board, the CCS7710D board, and the Apple Super Serial board. The CCS7710A is a data terminal board (no null modem needed), the CCS7710D is a data communications board (null modem needed), and the Super Serial Board can be switched to either arrangement. His Apple II also has the Apple 80 column board.

For software, we used ASCII Express's "The Professional."

The first thing to do is to set both computers to the same parameters. We used 38N1E for the Model 100 and the same for the Apple IIE: 300 baud, 8 bit words, no-parity, one stop bit, and X-ON/X-OFF protocols. All of the Apple II parameters are in the configuration menus of the Install program (you get there from "PRO" menu number 2, the percent option), X-ON/X-OFF in the fourth menu, the rest in menu one. Don't forget to set the Apple to full duplex (menu one) and permanent carrier (menu four).

IMMEDIATE SUCCESS. The net result of these settings was immediate and reliable communication between the two computers. We transferred several files back and forth, both saving and loading them from the Apple II disk drives. We tried it at both 300 baud and 1200 baud. The files sent by the Model 100 were .DO files, which means the files were all in standard ASCII format. Any word processor capable of reading an ASCII file can use the files saved by "The Professional."

We powered-down both computers and plugged in the CCS7710D. The settings and parameters were the same except that we had to use a null modem attached to the connecting cable. The results were also the same, reliable and accurate communications. Both 300 and 1200 baud were tested.

Next we tried the Super Serial Board in slot 1, using the data terminal setting. We again used the same parameters and configurations, and again had reliable communications at both 300 and 1200 baud.

BASIC FOR-NEXT LOOP. Since we were having such good luck with the terminal program, we decided to try Basic.

A couple of years ago I transferred

several programs for my Model I to an Apple II computer without a terminal program by setting the Apple to accept the RS232 as keyboard input. What I did was save the program in ASCII format on my Model I disks, then had a program read each line of the program into a variable and send it to the RS232 using PRINT#, and thus to the Apple. We had to do it this way because Applesoft Basic tokenizes each line as it is received.

Sending the program as one long data stream to the Apple results in lost characters as the Apple tokenizes the line while characters are still arriving at the RS232. The Basic program in the Model I used a simple For-Next loop to delay between each line transmitted, giving Applesoft time to complete the tokenization before the next line was sent.

NO TRANSFERRING WITH 1 PROGRAM.

While we were able to get the Apple to accept whatever was typed on the Model 100 as keyboard input, and things sent to the Apple video as output to the Model 100, we couldn't get programs to transfer. It seems that whenever the Model 100 sent out the information in the variable (one ASCII line of the program), it also sent a carriage return and line feed (control-J).

The carriage-return indicated the end of the line to Basic, but Applesoft Basic interpreted the control-J as the first character of the next line received. Because Applesoft Basic also insists any line starting with a control-J has a syntax error, all the transmitted lines, except the first one, were rejected.

We tried Integer Basic, with the same lack of results. Only this time not even the first line was accepted.

POSSIBLE WITH TWO. If two programs were used, one sending in the Model 100 and one receiving in the Apple, it would be possible to transfer a data file or program, one line at a time, to disk. The Model 100 program would read the file from RAM one line at a time, and send it to the Apple. After each line is sent, the Model 100 would go into a For-Next loop to delay the transmission of the next line for a few moments, giving the Apple time to save the line to its disk drive.

The Apple program would use the

input command to capture each line sent from the Model 100. Each line would be saved to disk, building up an ASCII file. To determine the length of time the Model 100 needs for the For-Next loop would require some experimentation, and would depend on the length of the longest line sent, as well as the amount of free space on the disk.

FROM BAD TO WORST. After finishing the experiments with Basic, I realized we were using an 80-column board in the Apple. I suggested that we remove the 80-column board and see if we could get faster, reliable data transfer rates. This was figuring that the 80-column board was slowing things down by giving the Apple more work to do while displaying the incoming information.

Boy, was that a mistake! We actually ended up losing the reliable 1200 baud data transfer. It seems that the 80-column board was actually relieving the Apple II of direct video memory management, letting it devote more of its CPU time to the RS232 card. Removing the 80-column board slowed down all three RS232 boards to only 300 baud.

At the same time we realized that we weren't getting proper X-ON/X-OFF protocol. The proper protocol should allow higher baud rates by setting the hardware to inhibit transmission of data from the other computer whenever the receiving computer is too busy to get the full transmission. (For the technically minded, these are RS-232 data lines 4-CTS, 5-RTS, and 6-DSR.) In other words, you should be able to set both computers to 9600 baud without losing characters (unless the CPU clock speed won't support these higher data rates).

TEMPERAMENTAL PROTOCOL. In theory, after each byte was sent, the receiving computer would tell the transmitting computer to wait while it does the required memory management before it's ready for the next character. The end result is that the data is actually being received at about 1000 bits per second instead of 9600 bits (in the Model 100-Apple II situation). This is due to the pause between each byte sent (approximately 11 bits: word length, parity bit, start bit, and stop bits).

The fact that this protocol does work in some cases (and therefore the Model 100 isn't at fault for the prior failures) became apparent when we attached the Model 100 to an Apple III. We needed a null modem in the cable connection, and used Apple's ACCESS III as the terminal program.

Using the same parameters as before, 38N1E, we were able to send and receive files at 2400, 4800, and 9600 baud, as well as the standard 300 and 1200 baud.

It was interesting to note that the Model 100 received at the higher baud rates without losing characters. The actual data transfer rate was only 1200 baud, since the Model 100 LCD slowed the Apple III transmission down to the highest update speed the LCD was capable of reaching. Eyeballing it, it seemed to be just a shade above 1200 baud. Doubling the baud rate from 1200 to 2400, and then again to 4800 didn't seem to increase the speed with which the data scrolled across the LCD of the Model 100.

Neither the Apple II, with any of the three RS232 boards, nor my Lobo Max-80 would do this. The only reasonable conclusion seems to be that the hardware protocols (CTS, RTS, and DSR) of the other computers

aren't properly implemented.

BACK TO COMMUNICATIONS. We tried to use ASCII Express's "The Professional" in the Apple II Emulation mode on the Apple III, but couldn't make any progress. "The Professional" kept getting stuck in the Install program, and refused to go to the terminal mode of "The Professional."

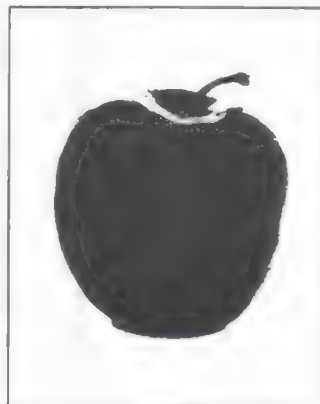
Well, we have several points of advice for you if you're thinking of getting your Apple II and your Model 100 communicating. First, match the hardware board to either use a null modem or not. If you want to use a modem with your Apple II, you'll need the data communications board which requires a null modem to communicate directly with other computers.

Second, make sure the data transfer parameters are the same, and start with 300 baud until you know things are working correctly.

Third, the easiest and quickest method of transferring files requires using some type of RS232 communications program. ASCII Express's "The Professional" seems to be a very popular and powerful program.

PERSEVERE. If you want to make the transfers in Basic, you'll have to experiment with two simple programs, one for the Model 100 and one for the Apple. The Model 100 program will have to have an automatic delay after each line sent to the Apple, so that the Apple will have time to save the line to disk.

Finally, remember that many people are successfully using the Apple II for Model 100 data storage. So, if you're having problems, the difficulty is probably just a slight misunderstanding on your part. Perseverance pays off. ▽



TAP INTO THE FREE DATA BASE WITHIN YOUR ROM

Ever wish you could use schedule and address functions on files other than NOTE.DO and ADRS.DO? Your wish is our command.

By JESSE BOB OVERHOLT

When a machine as feature-packed as the 100 comes along, all owners will have their favorite characteristics. The ADDRSS and SCHEDL programs are probably high on most folks' lists. And while these are not exactly world-class data-base managers, they are great for quickly locating a piece of information, such as a phone number or an appointment.

There's only one problem: I wish I could use these little gems on files other than ADRS.DO and NOTE.DO. Oh, sure, I know you can write a simple Basic program to rename other files as NOTE.DO or ADRS.DO, but this is a clumsy approach. It can also be rather deadly should you forget to change the names back to their original values. Okay, so what's the answer? How can ADDRSS and SCHEDL be made to work with other files?

TWO-FOLD FREEBIE. Well, friends and neighbors, I have good news and bad news. The good news is those generous folks in the Tandy tower have given every 100 purchaser a simple data-base program *absolutely free*. Perhaps they did this in gratitude for your plunking down hard-earned cash for a Model 100, thus helping to prevent Apple from making a hostile takeover bid for Radio Shack. Whatever the motivation, you did get a nice freebie with your portable computer.

The bad news? Well, it seems the ADDRSS and SCHEDL programs, with the exception of a half-dozen or



so bytes, are actually *the same program*. This program is also the same free data base that I mentioned before. I'm sure this comes as quite a shock, but there is a good reason. By sharing most of the machine instructions between ADDRSS and SCHEDL, it was possible to get both programs in the limited ROM space of the 100. This sharing is also what allows us to use the program with other files.

To demonstrate how to use the ADDRSS-SCHEDL program with other files, I have constructed a simple Basic program. Called DBASE.BA. It allows to a file called NAME.DO. The program is short so that even non-typists should have little difficulty with keying it into the 100. A detailed, line-by-line analysis follows for those who may wish to modify DBASE for their own purposes. If you are unsure how to modify a Basic program, check the Model 100 manual, or consult a friendly, neighborhood programmer.

THE BREAKDOWN. Lines 10 to 200 are full-line comments, used only to document how the program may be changed. You do not need to enter

these lines if you want to save memory or typing time.

Line 210 establishes all variables as integer type, both to save memory and to simplify programming.

In line 220 the name of the file to be accessed is put into the variable called FILE\$. This name *must* be all capital letters, and the .DO is mandatory. Experienced Basic users may wish to replace this line with an INPUT statement to make the program general-purpose. Whatever modifications are made, the all-caps rule must be followed. If the file name is not in the proper form the ADDRSS-SCHEDL program will simply report that the file cannot be found and will return to the main menu.

Line 230 sets the variable PR in order to specify a rather trivial option. If PR is set to 0 then the ADDRSS-SCHEDL program will prompt with "Adrs", while values from 1 to 255 will cause the "Schd" prompt to be used. Since the program operates in exactly the same way, the prompt is of no consequence.

TAKE HEART. The "heart" of DBASE is in lines 240 to 290. First, these lines reserve four bytes of RAM in variable PG!, for purposes of loading in a very short machine-language program. Secondly, the machine-language program is POKEd into memory as it is read from DATA statements.

Lines 300 to 340 wrap things up. In lines 300 to 320 the file name contained in FILE\$ is POKEd into a special name buffer at address 64985 (FDD9 hex). Then in line 330 a zero byte is POKEd in to mark the end of the name. Finally, in 340, the CALL is made to the short machine language program contained in PG! to enter the ADDRSS/SCHEDL program.

Once the file has been accessed by the ADDRSS-SCHEDL program you may use the find and Lfnd commands to search it. These commands will work exactly as described for the ADDRSS and SCHEDL programs in the Model 100 manual. The only difference is that you are searching your own file instead of the NOTE.DO or ADRS.DO files.

EXPERIMENT A BYTE. If you're not a programming fanatic, you may be content to use DBASE.BA as it is. Experienced programmers may want to experiment a bit. Using DBASE.BA as a starting point, you may make any changes you wish.

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Lines 240-340 need to remain pretty much as is, but you might want to use more creative methods to arrive at a file name.

Hard core bit twiddlers will no doubt want to know the "inside information. The ADDRSS program entry point is 5B68 hex, and SCHEDL is at 5B6F hex. The "general" entry point for this program is at 5B74 hex. It expects the A register to contain 0 for the "Adrs" prompt or non-zero for "Schd" prompt. The DE register pair must contain the address of the file name, which must be terminated by a 0 byte.

Only eight bytes of this name, however, are copied to the name buffer at FDD9 hex. If the file name is longer than eight characters, then ADDRSS-SCHEDL will report that the file could not be found. This problem is solved by preloading the name into FDD9 and pointing DE to it. Exit from the ADDRSS-SCHEDL program is always to MENU.

GOLD IN ROM? Well, that's it. You now have one more application program for your 100, at absolutely no charge! As time goes on perhaps even more "gold" will be discovered by mining the ROM. ♣



```

1 T=FRE(0)
: CLEAR T/2
: HX$="0123456789ABCDEF"
2 ON ERROR GOTO 8
3 RESTORE
: READ CO$
: READ BG, LN, EP
4 PRINT
: PRINT
: LC=BG
: IF BG<HIMEM THEN PRINT
"Resetting HIMEM"
: CLEAR 500, BG
: RUN
5 READ A$
: IF A$="END" THEN 6
ELSE GOSUB 9
: GOTO 5
6 SAVE MCO$, BG, BG+LN-1, EP
7 END
8 PRINT "err ="ERR "in line"ERL
: STOP
9 IF LEN(A$)>1 THEN FOR X=1 TO
LEN(A$)/2
: PRINT "**";
: POKE LC, (INSTR(HX$, MID$(A$,
X*2-1, 1))-1)*16+INSTR(HX$,
MID$(A$, X*2, 1))-1
: LC=LC+1
: NEXT X
10 'DBASE.BA

```

```

20 'A "free" Data Base program for
the
30 'TRS-80 Model 100 discovered and
40 'exploited by Jesse Bob Overholt.
50 '
100 'Customization instructions:
110 '1. EDIT line 220 to reflect the
120 ' name of your Data Base file.
130 ' This file MUST be a .DO file.
140 '
150 '2. EDIT line 230 to reflect the
160 ' prompt string used while
170 ' accessing the file.
180 ' 0=Prompt with "Adrs"
190 ' 1=Prompt with "Schd"
200 '
210 DEFINT A-Z
220 FILE$="NAME.DO" 'File name
230 PR=0 'Prompt code
240 PG!=0
250 FOR N=0 TO 3
260 READ X
270 POKE VARPTR(PG!)+N, X
280 NEXT N
290 DATA 235, 195, 116, 91
300 FOR I=1 TO LEN(FILE$)
310 POKE 64984+I, ASC(MID$(FILE$, I, 1))
320 NEXT I
330 POKE 64985+LEN(FILE$), 0
340 CALL VARPTR(PG!), PR, 64985

```


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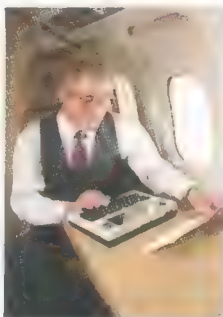
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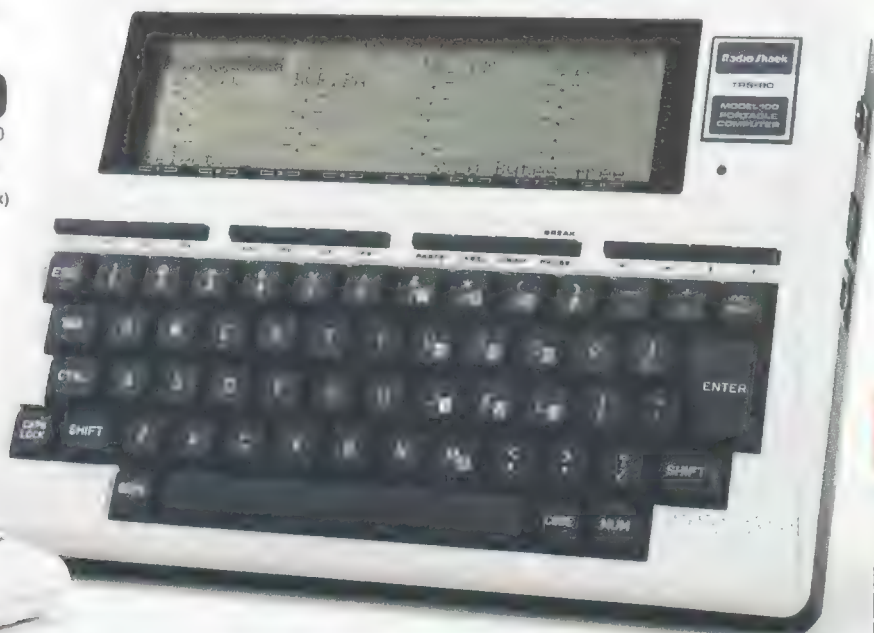
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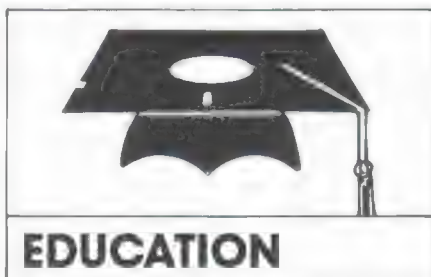


GET OUT FROM BEHIND PAPERWORK DRUDGERY WITH CLASSROOM MANAGER

Automating tedious clerical duties can free you for more one-to-one interaction with your students.

By JONATHAN ERICKSON and ROBERT J. SAYRE

Editor's Note: This article is based on a chapter from The Model 100 Book: A Guide to Portable Computing by Jonathan Erickson and Robert J. Sayre, copyright © 1984 by Osborn/McGraw-Hill, used by permission of Osborn/McGraw-Hill.



A daily teaching load of six classes, each having 30 students, means that, if you're a teacher and you don't plan right, you could end up grading as many as 180 assignments in a single day. You don't mind doing that — it's part of teaching. But you do mind clerical duties like figuring class averages, because they take away from working one-to-one with the students.

Classroom Manager goes a long way toward freeing you from those clerical duties. Furthermore, the program provides you with valuable information you wouldn't otherwise have had time to compile and, that, in the long run, helps you become a better teacher.

ABOUT CLASSROOM MANAGER.

Classroom Manager helps you keep track of student performance by providing a means of recording students' grades on assignments and exams, and

by averaging those grades for you. When you need to, you can retrieve the grades of a particular test or student. You can even keep the records for each class separate from those of the others, and you can keep all of your records in the Model 100's memory.

The program not only helps you become a more efficient teacher, but it can help your students, too. It shows them their progress — assignment by assignment and in relation to the other students in the class. By doing so, students can see where they need to work harder.

To use Classroom Manager, you need to type in the program listing accompanying this article. Then type in a .DO file that lists your students, separated by class. The Basic program automatically creates other .DO files to store grades for various assignments. Furthermore, individual and class av-

erages are automatically calculated as is the class standard deviation. This information is useful for establishing curves discussed later in this article.

CONNECTING THE HARDWARE. To use this program, you must have a parallel printer connected to your Model 100. Before making the connection, be sure the power to both units is off. Proper connection requires that you also use the Radio Shack Model 100 parallel printer cable.

Since a number of .DO files will be used, we strongly recommend you use a cassette recorder to store data on tapes so you don't run out of memory.

Finally, while a Model 100 with 8K of RAM can accommodate the Basic program, CLASS.BA, it can restrict the size and number of .DO files. Therefore, we recommend you use Classroom Manager with a Model 100 having at least 16K of RAM.

SETTING UP THE SOFTWARE. CLASS.BA is a Basic program that interacts with several .DO files. You'll need to type in both the Basic program and a .DO file that contains a list of student names. CLASS will read the .DO file and will create additional .DO files as needed.

To type in the Basic program CLASS, move the Model 100 main menu cursor to BASIC and press enter. Basic will display copyright information and the OK prompt and below them a blinking cursor. Type in the program just as it is listed. Be sure to begin each line with a number (the numbers 10, 20, 30, etc.) and to end each line by pressing enter.

Once you have typed in the program, check it line by line for errors, but first save it in the Model 100's memory by typing:

SAVE "CLASS" <enter>

We also suggest you save the pro-

gram onto cassette tape at this time. Connect a cassette recorder to the Model 100 (see the owner's manual for your recorder and the Model 100 for details on setting the volume control). Simultaneously press the recorder's record and play buttons. Be sure you're in Basic and Classroom Man-

ager is loaded into memory. Then type:

CSAVE "CLASS" <enter>

When the Basic prompt and blinking cursor return, press F8 to return to the Model 100 main menu. The program will be listed there as CLASS.BA.

HOW CLASSROOM MANAGER DOES WHAT IT DOES.

Here is how the modules in Classroom Manager work:

MODULE 1: Initialization and Classroom Manager Main Menu. This routine, lines 20 through 150, drives the others. It initializes the number of open files to three, defines the error routine, and defines the scores array SS to 101 elements (0-100). It then displays the Classroom Manager main menu and waits for you to press number key 1, 2, or 3.

MODULE 2: Input Data into a Grade Report File. This routine, in lines 160 through 380, lets you create a grade report file. It asks for the class identifier, the title and number of the grade report, and the number of points possible on the grade report. Note that the program truncates the grade report title to a maximum of 20 characters.

The program creates a grade report .DO file, and naming it by concatenating G and the class identifier and grade report number, then adding the extension .DO. Once it has opened the file, the program writes a heading made up of the number of points possible and the report title.

The program then opens the names file NAM.DO, corresponding to the class identifier, presents you with each name in turn, and asks you for the student's grade. (To keep the prompts neatly displayed, the program truncates the first and last names to 15 characters or fewer.)

When it reaches the end of the NAM.DO file, the program closes both that and the new grade report file and returns to the Classroom Manager main menu.

MODULE 3: Retrieve Grades. This routine, lines 390 through 460, retrieves grades from the grade report files. After prompting for the class identifier, the program asks you whether you want to summarize for an individual student or for an individual test. According to your response, the program calls module 3-A or 3-B.

MODULE 3-A: Summarize for a Student. This routine, lines 470 through 1180, summarizes all the grades for a particular student. It prompts first for the student name and then whether you want the output displayed on the screen or printed out. The module locates the student's name in the NAM.DO file and assigns this position to CT. If the program can't find the requested student name, it reports this and returns to Classroom Manager's main menu.

The module then reads in grade report files sequentially from 01 to 99. As it reads in the scores for each report, it stores them in student grade slots, SS(i). When the module reaches the entry for the requested student, it prints (to screen or printer as specified) the grade report title, the maximum points possible, and the points achieved by the student. The module then reads in the rest of the file, adding that student's other scores into appropriate slots of SS(i).

The module continues to open grade report files until it either reaches number 99 or runs out of files, at which time it breaks out to the error routine (Module 5) and returns to line 870. At this point, the routine sums up the total for each student (SS(i)) and then finds the class average, and the standard deviation. It re-

ports these three sets of data. Finally, the routine returns to Module 3.

MODULE 3-B: Summarize for a Grade Report. This routine, lines 1190 through 1730, summarizes the scores for a particular grade report. It prompts first for the grade report number and then whether you want the output displayed on the screen printed out.

It reads in names from the names files and the corresponding scores from the appropriate grade report file. As it prints the names and scores to screen or printer, it also stores the scores in SS(i). When the module has read in all of the names and scores, it calculates the average grade and standard deviation on the grade report. Finally, the routine exits to Module 3.

MODULE 4: Return to the Model 100 Main Menu. This two-line routine, lines 1740 through 1750, ends the program and returns control to the Model 100 main menu.

MODULE 5: Error Processing. This routine, lines 1760 to the end of the program, handles any errors in the program. Generally, the program calls this routine in either of two eventualities: If you have tried to access a file that doesn't exist, the module tells you that it couldn't find it and gives you the option of listing the current RAM files before returning to the Classroom Manager main menu; or, if Module 3-A has run out of grade report files and tries to access a file that doesn't exist, the program simply returns to a point in Module 3-A where it calculates the average and standard deviation for the files that it has read in.

—J. Erickson and R. Sayre

The best way to check the program for errors is to run it. If there are any errors, the Model 100 will tell you the number of the line containing the mistake. Simply type the line (line number and all) the way it is listed in this article, then execute the program again.

If you can't type in the entire program at one sitting, save what you have typed. When you're ready to continue typing the program, load the previously typed portion, then type the rest, again saving it all under the same name.

NAM.DO. Classroom Manager keeps track of several different classes by using a .DO file to differentiate among them. Each class must have a separate roster that contains the students' names and ID numbers. The program requires that each class list *must* begin with the prefix NAM, followed by a three-character class identifier in the format: NAM class identifier .DO. (The Model 100 automatically adds the extension .DO.)

This identifier can be any string you want — for example, HIS for a history class or 101 for English 101. When listed on the Model 100 main menu, a typical class file might look like this: NAMMTH.DO (for math class names).

Don't forget that each class must have a separate names file. Once you've assigned a three-character class identifier, *remember it* or write it down, because before you can record or retrieve grades, you must type it in (just the three characters, not the prefix NAM).

The NAM.DO file must be created before you can use the Classroom Manager program. To create a NAM.DO file, position the Model 100 main menu cursor on the word TEXT and press enter. When TEXT asks you: Name of file to edit?, type in NAM, the three-character identifier and press enter. For instance, for a physics class, you might type: NAMPSC <enter>.

After you press enter, begin entering student names and ID numbers as follows:

- Type a student's last name
- Type a comma (,)
- Type a student's first name

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CLASSROOM MANAGER

```

10 ' *** CLASSROOM MANAGER -- 1983
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20 'MODULE 1 -- INITIALIZATION
30 MAX FILES =7
40 ON ERROR GOTO 1770
50 DIM SS(100)
60 CLS
70 PRINT @5,"WELCOME TO THE
   CLASSROOM MANAGER"

80 PRINT @51,"YOUR OPTIONS ARE:"
90 PRINT @131,"1) RECORD GRADES"
100 PRINT @171,"2) RETRIEVE GRADES"
110 PRINT @211,"3) END SESSION"

120 PRINT @288,"SELECT <1>, <2>, OR
   <3>";

130 A$=INKEY$
   : IF A$="" THEN 130
140 ON VAL(A$)GOSUB 170,400,1750
150 GOTO 60
160 'MODULE 2 -- INPUT DATA INTO
   GRADE REPORT FILE

170 CLS
180 INPUT "CLASS IDENTIFIER";CI$
190 IF LEN(CI$)<>3 THEN 180
200 INPUT "GRADE REPORT TITLE";GT$
210 GT$=LEFT$(GT$,20)

220 INPUT "GRADE REPORT NUMBER
   (01-99)";GN
230 IF GN<10 THEN GN$="0"+RI
   GHT$(STR$(GN),1)
   ELSE GN$=RIGHT$(STR$(GN),2)

240 INPUT "HOW MANY POINTS WERE
   POSSIBLE";PP
250 FF=0
260 OPEN "NAM"+CI$ FOR INPUT AS 1
270 OPEN "G"+CI$+GN$ FOR OUTPUT AS 2
280 PRINT #2,PP,GT$

290 TP=0
   : CT=0

300 CLS
310 IF EOF(1) THEN 370
320 INPUT #1,LN$,FN$,ID$
330 PRINT LEFT$(LN$,15);", ";
   LEFT$(FN$,15);", ";ID$
340 INPUT "SCORE";SC
350 PRINT #2,SC

360 CLS
   : GOTO 300
370 CLOSE
380 RETURN

```

```

390 'MODULE 3 -- RETRIEVE GRADES
400 CLS
410 FOR I=1 TO 100
   : SS(I)=0
   : NEXT I
420 INPUT "CLASS IDENTIFIER";CI$

430 IF LEN(CI$)<>3 THEN 420
440 INPUT "SUMMARIZE BY <A>SSIGNMENT
   OR <S>TUDENT";SM$

450 IF SM$="A" OR SM$="A" THEN GOSUB
   1200
   ELSE IF SM$="S" OR SM$="S" THEN
   GOSUB 480
   ELSE 440

460 RETURN
470 'MODULE 3-A -- SUMMARIZE FOR A
   STUDENT

480 PRINT "WHICH STUDENT (LAST NAME,
   FIRST NAME)";
490 INPUT LN$,FN$

500 LN$=LEFT$(LN$,15)
   : FN$=LEFT$(FN$,15)
510 INPUT "OUTPUT TO THE <S>CREEN OR
   <P>RINTER";OP$

520 IF OP$="S" OR OP$="S" THEN PF=-1
   ELSE IF OP$="P" OR OP$="P" THEN
   PF=0
   ELSE GOTO 510
530 PF=0
540 OPEN "NAM"+CI$ FOR INPUT AS 1
550 CT=1
560 IF EOF(1) THEN GOTO 1150

570 INPUT #1,LI$,FI$,ID$
580 IF LI$<>LN$ OR FI$<>FN$ THEN CT=
   CT+1
   : GOTO 560
590 CLOSE 1
600 TS=0
   : TP=0
610 IF NOT PF THEN 670
620 CLS
630 PRINT LN$;", ";FN$;", ";ID$

640 PRINT "SCORE ON "
650 PRINT @240,"PRESS <ENTER> FOR
   NEXT SCORE";

660 GOTO 690
670 OPEN "LPT:" FOR OUTPUT AS 2
680 PRINT #2,LN$;", ";FN$;", ";ID$

690 FOR I=1 TO 99

```


- Type a comma (,)
- Type the ID number
- Press enter,

The results should look like this:

Waisner, Patty, 1501 enter
Drury, Rene, 1621 enter
Garr, Brian, 1434 enter

Classroom Manager does not require any specific order of entry. You may enter them alphabetically, by ascending ID number, or whatever system you choose. When you have entered all of the names and numbers for a particular class, press F8 to return to the Model 100 main menu.

USING CLASSROOM MANAGER.

Once you've created a NAM.DO file that contains a class roster, you can begin using the CLASS.BA program to record and calculate grades.

To do this, position the Model 100 main menu cursor on the word CLASS.BA and press enter. Classroom Manager's main menu will then appear.

RECORDING GRADES. To record grades for a test, report, or homework assignment, press number key 1 (not function key 1). Classroom Manager will ask you: Class Identifier?

You should type in the three-character class identifier you used to create a particular NAM.DO file. For instance, if you want to record grades for the physics class file you created earlier, you would respond: PSC <enter>.

The program then asks: Grade report title? This title is a name you can use to identify the grade data; for example, Midterm, or Jan 19 homework.

After you enter the title, the program will ask you for a grade report number. For the first report in the grade report sequence, type 01, and for subsequent reports, 02, 03, and so on. (Do not skip a grade report number; that is, don't go from grade report number 04 to number 06. The grade retrieval part of the program reads in grade report files by sequential order.)

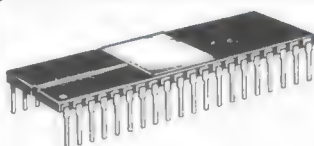
Finally, Classroom Manager will ask you how many points were possible for this grade. Type in the maximum number of points possible for the current assignment.

Classroom Manager will then display the name of each student in this class (as listed in the appropriate

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NAM.DO file) and ask you for the score each got on this assignment; for instance:

Waisner, Patty 1501
Score?

Type in the student's grade and press enter. The next student name will be displayed. When you have entered the score for the last student in the file, the program will return to the Classroom Manager main menu, where you can either record more grades, retrieve grade summaries, or return to

the Model 100 main menu.

When you return to the Model 100 main menu, you'll find a new file listed there with the following name in the format:

Class Identifier:Grade Report Number.DO

This .DO file will contain all of the grades for the grade report number you typed in. In our physics example, the file would be listed as GPSC35.DO: G for grades; PSC for Physics; and 35 for grade 35. Thus, you can have sev-

eral G.DO files listed for each class; for instance:

GPSC01.DO
GPSC02.DO
GHIS01.DO
GBIO10.DO
GMTH05.DO

The Model 100 Main menu has room for only 24 files, five of them reserved for the 100's built-in software. With CLASS.BA and NAM.DO in your 100, that leaves room for only 17 G.DO files, we recommend that you regularly store them on cassette tape, or you will quickly run out of room on the main menu. Be sure to label and date all cassette tapes to assure easy access to those files.

RETRIEVING GRADES. Once you have entered one or more grade reports, you can retrieve the grades for:

- A particular student;
- A particular test; or
- All students on all tests.

To do this, select option 2 from the Classroom Manager main menu. When you do, the program will ask you: Class identifier?

Type in the three-character class identifier you previously assigned to the grade file you want to examine. For instance, when Mary was ready to examine the final grades on her physics exam, she typed:

Class identifier? PSC enter

After you have done so, the program asks whether you want to see how the entire class did on a particular test or how a particular student did on several tests.

ASSIGNMENT SUMMARY. If you want to see the scores on a particular class assignment (say, homework or a test or report) type:

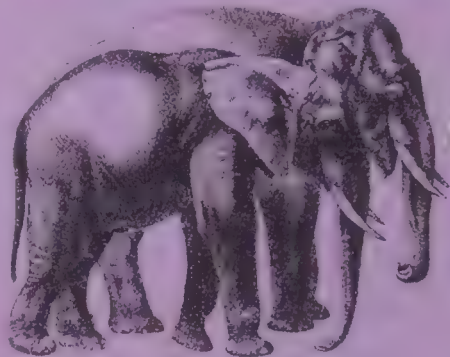
A <enter>

Then the program will ask you which assignment (that is, which grade number) you want to examine:

Grade report number (01-99)?

Type in the number you previously assigned to this grade report. To see how the class did on your final exam (grade #35), you would type:

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Signature _____

Name _____
Address _____
City _____ State _____ Zip _____

Grade report number (01-99)? 35
<enter>

Finally, the program asks: Output to the <S>creen or <P>rinter?. Type S and press enter to display the grades on the Model 100 display or P <enter> to print them out on a parallel printer.

GRADES ON SCREEN. When you answer the output prompt by typing S and pressing enter, the name and ID number of the first student in the NAM.DO file for the appropriate class is displayed. Directly below the student's name will be his or her score on the specified assignment, followed by the number of points possible.

When the score of the last student in the file has been displayed, Classroom Manager will display the class average and class standard deviation for the assignment.

PRINTING GRADES. Before selecting the printer option for the output prompt, be sure a parallel printer is connected to and on line with your Model 100. If a printer is not, the computer will "lock-up." (If this happens, press break.)

When you answer the output prompt by typing P and pressing enter, the Classroom Manager will print out the names, ID numbers, and scores of each student in the appropriate NAM. DO file. The program will print the total number of points possible on the assignment, followed by the class average, and finally the class standard deviation.

STUDENT SUMMARY. If you want to see how a particular student did on each assignment, answer the summary prompt by typing: S <enter>.

Type in the student's last name, then first name, separating the two by a comma. (The names must be typed in exactly as you entered it in the NAM.DO file, including upper- and lowercase letters.)

Next the program asks: Output to the <S>creen or <P>rinter? Type S and press enter to display the student's grades on the Model 100 display or P <enter> to print them out on a parallel printer.

SCREEN DISPLAY. When you answer the output prompt by typing S and pressing enter, the name and ID number of the first student in the NAM. DO file for the appropriate class will

appear. Directly below the student's name will be the grade the student got on the first assignment identified by the grade report title, followed by the maximum number of points possible. To see how the student did on all subsequent assignments, press enter.

After all of a given student's scores have been displayed, the Classroom Manager will display the total number of points the student earned as compared to the total number of points possible. Then this can be compared to the class average and standard deviation.

PRINTING SCORES. Again, before selecting the printer option for the output prompt, be sure a parallel printer is connected to and on line with your Model 100. If none is connected, the computer will "lock-up."

When you answer the output prompt by typing P and pressing enter, the Classroom Manager will print out the student's name, ID number, and scores on each assignment. Then the program will print the total number of points possible on the assignment, followed by the class average and the class standard deviation.

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OTHER ACTIVITIES. There are several more uses for the Classroom Manager program.

- Keeping students aware of their progress. You can use the gradebook program to keep each student up to date on his or her class progress. For example, once a week, you may want

to print out and distribute the individual scores to each student.

- Establishing a "curve." You can use the class average and standard deviation to set up a grade curve. The size of the standard deviation is a good indication of how many points should make up a letter grade. By basing this value around the class average, you

can come up with a grade scale. For example, if the class average was 71.5 and the class standard deviation was 13.0, then the grade scale will be:

A's = 91-highest score

B's = 78-91

C's = 65-78

D's = 52-65

F's = 0-52

```

700 IF I<10 THEN GN$="0"+RIG
      HT$(STR$(I),1)
      ELSE GN$=RIGHT$(STR$(I),2)
710 FF=1
720 OPEN "G"+CI$+GN$ FOR INPUT AS 1
730 INPUT #1,PP,GT$
740 IF LEN(GT$)<20 THEN GT$=GT$+" "
      : GOTO 740
750 TP=TP+PP
760 J=1
      : VS=0
770 IF EOF(1) THEN 900
780 INPUT #1,SC
790 IF SC>=0 THEN SS(J)=SS(J)+SC
      : VS=VS+1
800 IF J<>CT THEN 880
810 IF PP THEN 850
820 PRINT #2,GT$;TAB(10);
830 PRINT #2,USING "###\ \###";SC;" /
      ";PP
840 GOTO 880
850 PRINT @49,GT$;" : ";
860 PRINT @66,USING "###\ \###";SC;"
      / ";PP
870 LINE INPUT AS
880 J=J+1
890 GOTO 770
900 CLOSE 1
910 NEXT I
920 J=J-1
930 TS=0
      : SM=0
940 FOR I=1 TO J
950 IF SS(I)>=0 THEN TS=TS+SS(I)
960 NEXT I
970 CA=TS/VS
980 FOR I=1 TO J
990 IF SS(I)>=0 THEN SM=SM+(
      SS(I)-CA)^2
1000 NEXT I
1010 SD=SQR(SM/VS)
1020 IF NOT PP THEN 1100

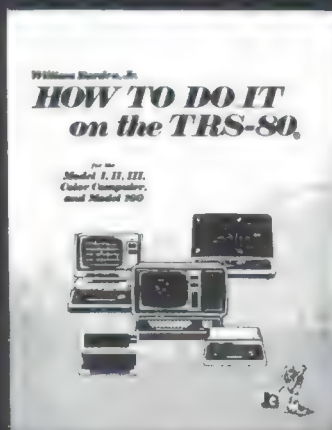
```

```

1030 CLS
1040 PRINT LN$;" , " ;FN$;" " ;ID$
1050 PRINT "TOTAL POINTS: ";SS(CT);"/";
      TP
1060 PRINT "CLASS AVERAGE: ";CA;"/";TP
1070 PRINT "CLASS STANDARD DEVIATION:
      ";SD
1080 PRINT
      : LINE INPUT "PRESS <ENTER> TO
      RETURN TO MENU";AS
1090 GOTO 1130
1100 PRINT #2,"TOTAL POINTS: ";SS(CT);
      "/";TP
1110 PRINT #2,"CLASS AVERAGE: ";CA;
      "/";TP
1120 PRINT #2,"CLASS STANDARD
      DEVIATION: ";SD
1130 CLOSE
1140 RETURN
1150 PRINT "I CAN'T FIND '";LN$;" , " ;
      FN$;" "
1160 LINE INPUT "PRESS <ENTER> TO
      RETURN TO MENU";AS
1170 CLOSE
1180 RETURN
1190 'MODULE 3-B -- SUMMARIZE FOR A
      GRADE REPORT
1200 INPUT "GRADE REPORT NUMBER
      (01-99)";GN
1210 IF GN<10 THEN GN$="0"+RI
      GHT$(STR$(GN),1)
      ELSE GN$=RIGHT$(STR$(GN),2)
1220 FF=2
1230 OPEN "NAM"+CI$ FOR INPUT AS 1
1240 FF=3
1250 OPEN "G"+CI$+GN$ FOR INPUT AS 2

```


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CLASSROOM MANAGER

```
1260 INPUT #2,PP,GT$
1270 INPUT "OUTPUT TO THE <S>CREEN OR
      <P>RINTER>";OP$
```

```
1280 IF OP$="S" OR OP$="S" THEN PF=-1
      ELSE IF OP$="P" OR OP$="P" THEN
      PF=0
      ELSE 1270
```

```
1290 IF PF THEN 1340
1300 OPEN "LPT:" FOR OUTPUT AS 3
1310 PRINT #3,TAB(30);GT$
      : PRINT #3,""
```

```
1320 PRINT #3,"NAME";TAB(33);"ID";
      TAB(18);"SCORE"
      : PRINT #3,""
```

```
1330 GOTO 1370
1340 CLS
1350 PRINT @40,"SCORE ON ";GT$;":";
```

```
1360 PRINT @240,"PRESS <ENTER> FOR
      NEXT SCORE";
```

```
1370 J=1
      : TS=0
      : VS=0
```

```
1380 IF EOF(1) THEN 1530
1390 INPUT #1,LN$,FN$,ID$
1400 INPUT #2,SS(J)
```

```
1410 IF SS(J)>=0 THEN TS=TS+SS(J)
      : VS=VS+1
```

```
1420 IF PF THEN 1480
```

```
1430 IF (LEN(LN$)+LEN(FN$))<30 THEN
      FN$=FN$+" "
      : GOTO 1430
```

```
1440 IF LEN(ID$)<10 THEN ID$=ID$+" "
      : GOTO 1440
```

```
1450 PRINT #3,LN$;",";FN$;TAB(5);ID$;
      TAB(10);
```

```
1460 PRINT #3,USING "###";SS(J)
```

```
1470 GOTO 1510
```

```
1480 PRINT @0,LN$;",";FN$;",";ID$;
```

```
1490 PRINT @ (51+LEN(GT$)),USING "###\
      \###";SS(J);" / " ;PP
```

```
1500 LINE INPUT A$
```

```
1510 J=J+1
```

```
1520 GOTO 1380
```

```
1530 J=J-1
```


CLASSROOM MANAGER

```

1540 CA1=TS/VS
1550 SM=0
1560 FOR I=1 TO J
1570 IF SS(I)>=0 THEN SM=SM+(
    SS(I)-CA1)^2
1580 NEXT I
1590 SD1=SQR(SM/VS)
1600 IF PF THEN 1680

1610 PRINT #3,""
    : PRINT #3,"TOTAL POINTS
    POSSIBLE";TAB(36);

1620 PRINT #3,USING "###";PP
1630 PRINT #3,"CLASS AVERAGE";TAB(44);
1640 PRINT #3,USING "###.##";CA1
1650 PRINT #3,"CLASS STANDARD
    DEVIATION";TAB(33);
1660 PRINT #3,USING "###.##";SD1
1670 GOTO 1720
1680 CLS

1690 PRINT "CLASS AVERAGE: ";CA1;"/";PP
1700 PRINT "CLASS STANDARD DEVIATION:
    ";SD1

1710 PRINT
    : LINE INPUT "PRESS <ENTER> TO
    RETURN TO MENU";A$

1720 CLOSE
1730 RETURN
1740 'MODULE 4 -- RETURN TO MODEL 100
    MAIN MENU
1750 MENU
1760 'MODULE 5 -- ERROR PROCESSING
1770 IF ERR <> 52 THEN PRINT "ERROR";
    ERR;"IN";ERL
    : STOP
1780 IF FF=1 THEN RESUME 920
1790 IF FF=0 OR FF=2 THEN PRINT "I
    CAN'T FIND THE NAMES' FILE FOR
    ";CI$
    ELSE PRINT "I CAN'T FIND THE
    GRADE FILE FOR ";GRADE REPORT ";
    GN$

1800 INPUT "DO YOU WANT TO SEE A LIST
    OF THE RAM FILES";A$
1810 IF A$="Y" OR A$="Y" THEN FILES
1820 INPUT "PRESS <ENTER> TO RETURN TO
    MENU";A$
1830 RESUME 60
    
```

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BENDER'S BETTER WAY TO BETTER BASIC—2

Subroutines can add a professional touch to your programs. Here's how to build a library of them.

By J. GARY BENDER

In the first part of this series I recommended starting a system book. One of the sections of your system book will be subroutines. This article will present a few useful subroutines to get your library started.

I will carry it one step further by suggesting a "Basic Program Template." The template is used as the first draft of any program you write. By changing a few things and deleting the parts you do not need, you actually start a program with parts of it already written.

The template includes a subroutine library. This turns out to be an easy way to handle a library in Basic with the benefit that your programs will tend to have similar structures and layouts. The similarity will help you later when you need to make changes to old programs.

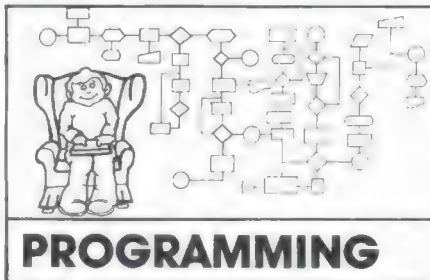
THE ADC'S. Let's get some definitions out of the way.

Code is the actual words and lines of a program. The phases of program development include:

- Analysis,
- Design,
- Coding,
- Debugging, and
- Documentation. (If you do it right, the documentation phase spans all the others.)

Coding is the translation of the design into Basic statements.

A subroutine is a block of code used in several places in a program. In Basic it is accessed by a GOSUB and ends with a RETURN. A subroutine serves two primary purposes:



(1) It reduces the size of the program if it can be used in more than one place, and

(2) It allows you to put the details of an operation in one place and deal with the overall program logic in another.

That second purpose is very significant to a programmer. If you've programmed your Model 100, you've already used subroutines — the ones built into Basic. In a sense, every keyword in Basic is a subroutine call. The functions are a special type of subroutine returning a value to the calling program.

A good example of "removing the detail" is a complex function like SQR. If you need a square root in a calculation, you should be comfortable and confident when using something like $A = \text{SQR}(B)$. You do not have to worry about the details of how a floating point square root is calculated. In fact, you probably don't care. I dare say, few readers of this article even know how to start writing a square root function. So what? It has been done before and you know it works.

LIBRARY CANDIDATES. That is what the idea of a library is based upon.

Usually your library evolves and grows as you develop new routines. The more useful ones can be generalized and added to the library. They are proven, useful programming tools you don't have to reinvent every time you write a program.

The most obvious candidates for a library are general utility subroutines needed by almost all programs — things like converting lowercase to uppercase, reading the keyboard interactively (character by character) rather than a line at a time, centering a line on the screen, and others. Depending on the type of programs you write most frequently, you will include personalized routines. For example, an engineer or financial analyst may include subroutines to do curve fitting and graphic displays.

BASIC CONSIDERATIONS. Basic presents some special problems when developing a subroutine library.

First, subroutines require some overhead. They're slightly slower than an in-line code. Any time you use a statement like GOSUB 21000, the Basic interpreter has to find line 21000. It must go to the beginning of the program and scan all the line numbers until it finds the target of the GOSUB. In a large program the time required is significant. A natural tendency is to put subroutines at the end of the program, since they represent details you don't want cluttering up the high level logic in the main body of code. You should, instead, place your most active subroutines near the front of the program and put routines that are infrequently accessed, or only used once, at the end.

Another shortcoming of Basic is subroutines are referenced by line number rather than by name. You will have trouble remembering from one session to the next what a GOSUB 520 is supposed to do. The subroutines section of your system book is intended to help, especially when looking at the "run" version of a program, after the comments and development information have been removed.

During development, I prefer to use named subroutines. They make the code much easier to understand and are easy to remember. There is a penalty for this approach. The program will be slower and bigger. However, you will probably have it working much sooner. After the program is de-

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BETTER BASIC

bugged and checked out, it is not a difficult task to change the named references to line numbers, if you want to.

A third area of concern when writing Basic subroutines are the variable names used within the routine and generalizing the method for passing data into and out of the routine. All variable names in Basic are global. If a subroutine uses I for an index in a For-Next loop, it is the same I that exists in the rest of the program. You do not want to take a chance of a subroutine being called inside a loop and have it accidentally modify the caller's index!

A naming convention is necessary to avoid this type of conflict. I have adopted the following guidelines and have little trouble with naming conflicts.

- Variable names starting with Q and Z are reserved for library subroutines. Z routines are the most general subroutines and normally do not rely on other routines. (They are primitives.) Q routines are the next higher level and may use some Z routines.

- Library routines always use two-character variable names. This frees all single character names for the application to use.

- All variables used within a library routine are explicitly typed (integer, single, double, string). That prevents problems due to an application using DEFINT A-Z. The application can still do so without interfering with the operation of a subroutine.

- Variables internal to subroutines use a digit for the second character of the name. This frees QA-QZ and ZA-ZZ names for dealing with the rest of the world.

- I try to be consistent in the use of variable names for getting data into and out of the library routines. For ex-

ample, ZS\$ is always the string used by a Z-routine; ZN% is always the returned integer value.

BASIC PROGRAM TEMPLATE. Putting this together, we can come up with a template that can be used to model every program we write. Since the structure of every program will be the same, it will make life a little easier if we always start with a predefined "empty" program and then build the application within that framework.

The next step is easy. If you always start a new program by loading an empty model, why not fill some of the space with commonly used subroutines? Presto! Instant subroutine library. You start a new program with parts of it already written. As far as having routines in the model program you know won't be used, select and cut are a lot faster and easier to use than writing lines of code.

I have laid out the empty program to use the blocks of code outlined in figure 1.

There is plenty of room to put code just about anywhere you want. Typically, the main program will only be a few statements long. It may only call a subroutine or two in the 1000-9999 block and handle some user options. If you stay with a consistent model, you will have an easier time working on different programs. For example, you can edit 20000-29999 in any of your programs and know you will get the initialization section.

STANDARDIZATION. You may have a different scheme you like better. Fine, but it should be a scheme that accomplishes the same objectives: standardization of your programs and faster development time.

Another approach is to put the subroutine library at 40000 and up. When you decide to use a library routine, you can change the line number in the edit mode and move it to a different loca-

```

0-100 Header info, call initialization, and GOTO the main program.
100-199 A special section to facilitate named subroutines.
200-999 Subroutine Library area.
1000-9999 Application specific subroutines.
10000-19999 The main program.
20000-29999 Initialization routine(s).
30000-39999 DATA statements.
  
```

Figure 1.

tion. I prefer the template as it is. It gets things ordered the way I want. A renumbering utility can be used later to eliminate the four- and five-digit line numbers.

The template has sufficient remark statements to remind you what goes where. The sections are separated with STOP statements. These are for those occasions when you forget a RETURN statement. Instead of wandering into the next block of code, you get a "BREAK AT ..." message. That should tell you something is wrong. (An END statement would protect the following block of code, but you would only get an OK prompt, with no indication of where the program terminated.)

SUBROUTINE DISPATCHER. The block at lines 100-199 serve as a subroutine dispatcher. When a subroutine is called by name, the string variable ZQ\$ is set. Instead of remembering where the subroutine is located, a GOSUB 100 call is always used. The string of IF statements in 100-199 test the name in ZQ\$ and goes to the subroutine. The RETURN is in the subroutine, so it can be used in the normal GOSUB fashion. For example, to center a string HI\$:

```
ZS$=HI$:ZQ$="center":GOSUB 100:
HI$=ZS$
```

Some people won't like that. It takes more typing. You can read the code, however, and tell what is happening to HI\$. Notice the string to be centered had to be moved into the standard string used by the subroutine and then moved back after the call. This is a close as you can come in Basic to calling a subroutine with arguments. It has the advantage of being nondestructive. The string in HI\$ is not changed by the subroutine.

By using a series of IF statements, it is easy to remove a reference to routines that are being deleted. It also documents what subroutines are in the program and where they are. The end of the chain is a "not found" error message with a STOP:RETURN. This makes sure you see it, but you can CONT if you want to. It pays to plan for your debugging sessions!

Since this series is not intended to teach Basic programming, but to teach techniques and present development tools, I will not go into the individual routines as far as explaining how they work. Hopefully you will be able to figure that out. I have included a short explanation of what each subroutine does in the model itself.

PUSH AND POP. One group of routines are, I believe, unique. At least I have never seen a reference to this approach in a Basic program. These are

```

0 REM Basic Pgm Template Nov 83
10 CLS
   CLEAR 1024
20 GOSUB 20000: initialize
30 GOTO 10000: to MAIN
99
100 REM General Subroutine dispatcher
151 IF ZQ$="fupper" THEN 511
   ELSE IF ZQ$="flower" THEN 512
152 IF ZQ$="center" THEN 520
153 IF ZQ$="isnum" THEN 530
   ELSE IF ZQ$="isalpha" THEN 535
154 IF ZQ$="entern" THEN 540
155 IF ZQ$="enters" THEN 550
156 IF ZQ$="cmatch" THEN 560
171 IF ZQ$="push#" THEN 710
   ELSE IF ZQ$="pop#" THEN 715
172 IF ZQ$="push1" THEN 720
   ELSE IF ZQ$="pop1" THEN 725
173 IF ZQ$="push#" THEN 730
   ELSE IF ZQ$="pop#" THEN 735
174 IF ZQ$="push#" THEN 740
   ELSE IF ZQ$="pop#" THEN 745
198 PRINT "**;ZQ$;** not found"
   : STOP
   : RETURN
199
500 REM Misc routines
510 REM Force UPPER/lower case in
   string ZS$
511 ZU%=1
   : GOTO 513: fupper
512 ZU%=0: flower

```

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the "push" and "pop" routines. You will find yourself in a large program wondering what variable names are in use or, conversely, what variable names are safe to use in a new portion of code. The ultimate solution is to figure out what is safe. This is an annoying interruption. When you get into some good programming, why stall your momentum ... or take a chance and fix it later (a more common approach). The push and pop routines let you safely proceed with your coding. If you never get back to fixing it up, you are not risking some funny bugs showing up.

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```
ZZ%=I: ZQ$="push%": GOSUB 100  
'save I  
FOR I=1 TO 1000: NEXT 'use I  
ZQ$="pop%": GOSUB 100: I=ZZ% 're-  
cover I
```

TALK TO YOUR USER. Next time we will get into writing the "user interface," so you guide the user rather than confuse or annoy him. It will include a few more routines for the library, too. Having routines easily available will let your programs have a professional quality with little more effort than an INPUT statement. ↗





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```

513 IF Z$="" THEN RETURN
514 FOR Z1=1 TO LEN(Z$)
  : Z2=ASC(MID$(Z$,Z1,1))
515 IF Z2 THEN IF Z2>96 AND Z2<123
  THEN MID$(Z$,Z1,1)=CHR$(Z2+32)
  : GOTO 517
  ELSE 517
516 IF Z2>64 AND Z2<91 THEN
  MID$(Z$,Z1,1)=CHR$(Z2+32)
517 NEXT
  : RETURN
519
520 REM center string Z$ for 40
  chars
521 IF Z$="" OR LEN(Z$)>38 THEN
  RETURN
522 Z$=STRING$(40-LEN(Z$))\2,
  32)+Z$
523 RETURN
529
530 REM isnum - test Z$ is numeric,
  Z$ is true it only 0-9,+,-,.
  (not E)
531 ZF=0
  : IF Z$="" THEN RETURN
  ELSE ZF=-1
532 FOR Z1=1 TO LEN(Z$)
  : IF INSTR("0123456789+-.",
  MID$(Z$,Z1,1))=0 THEN ZF=0
  : Z1=999
533 NEXT
  : RETURN
534
535 REM is alpha - test Z$, ZF=
  TRUE if all A-Z, a-z, or blank
536 ZF=0
  : IF Z$="" THEN RETURN
  ELSE ZF=-1
537 FOR Z1=1 TO LEN(Z$)
  : Z2=ASC(MID$(Z$,Z1,1))
  : IF (Z2>64 AND Z2<91) OR
  (Z2>96 AND Z2<123) OR Z2=32
  THEN 538
  ELSE ZF=0
  : Z1=999
538 NEXT
  : RETURN
540 REM enter - Numeric k/b input,
  returns Z$, ZN and ZN
541 Z$=""
  : ZN=0
542 Z1$=INPUT$(1)
  : IF Z1$=CHR$(13) THEN 546
  ELSE IF INSTR("0123456789",
  Z1$)>0 THEN Z$=Z$+Z1$
  : PRINT Z1$;
  : IF Z1$="" THEN ZN=2
  ELSE IF ZN=0 THEN ZN=1
  : GOTO 542
  ELSE 542
544 IF Z1$=CHR$(8) THEN IF LEN(Z$)>0
  THEN Z$=LEFT$(Z$,LEN(Z$)-1)
  : PRINT CHR$(8); " ";CHR$(8);
  : GOTO 542
  ELSE 541
545 GOTO 542
546 ZN=0
  : ZN=VAL(Z$)
  : IF ZN>-32679 AND ZN<32768
  THEN ZN=ZN
  : RETURN
549
550 REM enters - String k/b entry,
  returns Z$, only normal ASCII
  accepted
551 Z$=""
552 Z1$=INPUT$(1)
  : IF Z1$=CHR$(13) THEN 556
  ELSE IF Z1$<>CHR$(8) THEN 554
  ELSE IF LEN(Z$)>1 THEN Z$=
  LEFT$(Z$,LEN(Z$)-1)

```


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```

ELSE ZS$=""
553 PRINT CHR$(8); " ";CHR$(8);
: GOTO 552' backspace
554 IF Z1$>CHR$(31) AND Z1$<CHR$(128)
THEN ZS$=ZS$+Z1$

: PRINT Z1$;
555 GOTO 552
556 RETURN ' can "fupper" if need
560 REM cmatch - command matcher
compare ZS$ to ZC$, return ZF% =
-1 if shorter of two matches
same chars of other
561 ZQ$="fupper"
: GOSUB 100
: ZF%=LEN$(ZS$)
: IF LEN$(ZC$)<ZF% THEN ZF%=
LEN(ZC$)
562 IF ZF%=0 THEN RETURN
563 IF LEFT$(ZS$,ZF%)=LEFT$(ZC$,ZF%)
THEN ZF%=-1
ELSE ZF%=0
564 RETURN
569 '
700 REM Special Utility Subroutines
710 REM push% - temp save integer ZZ%
711 IF ZZ%(0)>9 THEN PRINT " push%
overflow"
: STOP
: RETURN
712 ZZ%(0)=ZZ%(0)+1
: ZZ%(ZZ%(0))=ZZ%
: RETURN

```

```

714 '
715 REM pop% - recover pushed ZZ%
716 IF ZZ%(0)<1 THEN PRINT " pop%
underflow"
: STOP
: RETURN
717 ZZ%=ZZ%(ZZ%(0))
: ZZ%(0)=ZZ%(0)-1
: RETURN
719 '
720 REM push! - temp store real ZZ!
721 IF ZZ!(0)>9 THEN PRINT " push!
overflow"
: STOP
: RETURN
722 ZZ!(0)=ZZ!(0)+1
: ZZ!(ZZ!(0))=ZZ!
: RETURN
724 '
725 REM pop! - recover pushed real
ZZ!
726 IF ZZ!(0)<1 THEN PRINT " pop!
underflow"
: STOP
: RETURN
727 ZZ!=ZZ!(ZZ!(0))
: ZZ!(0)=ZZ!(0)-1
: RETURN
729 '
730 REM push# - temp save double ZZ#
731 IF ZZ#(0)>9 THEN PRINT " push#
overflow"

```

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```

: STOP
: RETURN
732 ZZ#(0)=ZZ#(0)+1
: ZZ#(ZZ#(0))=ZZ#
: RETURN
734 '
735 REM pop# - recover pushed double
: ZZ#
736 IF ZZ#(0)<1 THEN PRINT " pop#
underflow"
: STOP
: RETURN
737 ZZ#=ZZ#(ZZ#(0))
: ZZ#(0)=ZZ#(0)-1
: RETURN
739 '
740 REM push$ - temp save string ZZ$
741 IF VAL(ZZ$(0))>9 THEN PRINT "
push$ overflow"
: STOP
: RETURN
742 ZZ$(0)=STR$(VAL(ZZ$(0))+1)
: ZZ$(VAL(ZZ$(0)))=ZZ$
: RETURN
744 '
745 REM pop$ - recover pushed string
ZZ$
746 IF VAL(ZZ$(0))<1 THEN PRINT "
pop$ underflow"

```

```

: STOP
: RETURN
747 ZZ$=ZZ$(VAL(ZZ$(0)))
: ZZ$(0)=STR$(VAL(ZZ$(0))-1)
: RETURN
749 '
998 STOP
999 '
1000 REM Application Subroutines
9998 STOP
9999 '
10000 REM MAIN program
19998 STOP
19999 '
20000 REM Initialization
20010 DEFINT A-Z
20020 PRINT
: PRINT TAB(12);"Program
Template"
20030 I=0
: J=0
: K=0' predefine frequently used
variables
20040 '
20980 I=PRE(" ")' garbage collection
20990 RETURN
29998 STOP
29999 '
30000 REM Data Statements
39998 STOP
59999 End-of-program

```

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(5.5 Amp. Hr. Unit)	90 - 100 Hrs.
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NEW PRODUCTS



CP/M COMPANION SATISFIES DESIRE FOR MORE RAM

Bundled with software included on a 5.25-inch floppy disk, the CP/M 2.2 Companion reads and writes IBM, Kaypro, Morrow, and Osborne disks. Manufacturers of the Companion, Companion Computers of Apex, NC, say it can add 256K of storage, printer spooling, port expansion and CP/M programs to portable computers or terminals. Its lightweight (8 pounds) and size (7-inches high by 4-inches wide by 14-inches wide) make it very transportable.

The Companion features: a 192K RAM Disk; 64K user RAM; a ROM with CP/M, copy, directory, and log programs; a 192K 5.25-inch disk drive; and the capability to add two additional drives. The Companion also sports two RS-232C serial ports (110-19,200 baud), bidirectional parallel port, and an expansion bus for up to 256K additional RAM or ROM).

Priced at \$1095, Companion Computers, Drawer CC, 192 Deerfield Rd., Apex, NC 27502, will take MasterCard or VISA.

IN THE BAG MEANS IN STYLE WITH PIGSKIN CASES

A California-based company says portable computer owners want to be noticed, and to that effect, have started producing custom pigskin carrying cases.

In the Bag Inc. President Bob Norrell predicted, "Microcomputers are moving more towards portability, and that by 1985, two out of every three

computers will be a portable weighing less than 10 pounds." To serve this upsurge in portability, In the Bag Inc. has designed a pigskin bag that will come in over 10 different colors.

Currently, there are three cases to choose from, with prices ranging from \$49.95 to \$59.95. In the Bag Inc. may be reached at P.O. Box 1154, El Toro, CA 92690, 714-837-2035.

NEW RECHARGEABLE BATTERY MAKES 100 EPITOME OF PORTABILITY

Model 100 users don't need to be caught on the road, high and dry, thanks to a new lightweight external battery system called Prairie Power. Due to a new technology using immobilized electrolyte construction, Bluestem Productions claims the independent rechargeable batteries can go anywhere, be used in any position, and are totally carefree.

The real value of the system, however, is in the energy it supplies. Bluestem President Richard Olsenius said, "The cost of supplying batteries or finding AC power is inconvenient. We are now marketing a battery that for the first time can save money and free the writers who can't depend on AC power or a store for shelf-worn batteries.... a writer can use [his] computer and our battery in the middle of nowhere for five hours each day and still have a month before they need a recharge (8 ampere-hour unit)."

The batteries come in three sizes: 8 ampere-hour, 5.5 ampere-hour, and 2.6 ampere-hour. Using Duracell as a comparison to Prairie Power's 8 ampere-hour battery, Olsenius reported the former costs \$55 annually if used an hour a day; the latter, a \$34.95 one-time cost, gives 160 hours of continuous power.

The system also works on other briefcase portables such as NEC's PC-8201A and is only available through Bluestem Productions, Box 334, Wayzata, MN 55391, 612-471-7795.



NEW INTERFACING PROVIDES EXPANSION TO GO FOR MODEL 100

Whether you are in the lab or in the field, data acquisition and process control are now more affordable than ever." That word comes from Elixor Associates about their new battery-powered interfacing for the Model 100.

The PL-100 System, for \$498, includes an expansion chassis that holds three boards, battery charger with AC adapter, two empty expansion slots, and combination I/O board.

The I/O board comes with 16-channel, 8-bit analog input, 4-channel, 8-bit analog output, four analog level sense inputs, 16-bit digital output, and 16-bit digital input. The entire system uses rechargeable batteries.

Interested readers can contact Elixor Associates, P.O. Box 246, Morris Plains, NJ 07950, 201-299-1615.

RAM EXPANDER MAKES TWO 32K MEWS OUT OF ONE

If you only have an 8K Model 100, you can now add an additional 32K external expansion ram. PG Design Electronics is marketing this easy expansion RAM for "about \$300." Still in prototype, the manufacturers claim the 32K requires no hardware modification, is bank selected (you can switch from RAM to expanded 32K RAM) and store two programs at once without reloading.

For more information about the 32K, that also will expand your 16K, 24K, or 32K Model 100, contact PG Design Electronics, 66040 Gratiot, Richmond, MI 48062, 313-293-6639.

SYBEX OFFERING ARMCHAIR READING FOR LAP-SIZED COMPUTER

Getting to know it is getting to love it," says author Orson Kellogg about the Model 100. Having just written, *The Radio Shack Notebook Computer* for SYBEX, Kellogg provides a non-technical guide on how to better use the 100.

The scope of the paperback covers the machine's built-in word-processing and data-base programs, its telecommunication features, and how to access outside data bases. Illustrated, it also contains short programs that can be entered into the computer "without programming experience." A review of new and upcoming products for the machine also is included.

The *Radio Shack Notebook Computer* is available at most book and computer stores for \$8.95.

CERES SOFTWARE'S ELF PROGRAM LINE OFFERS GIANT RESULTS

Ceres Software Inc. is offering four software packages it will "enhance the capabilities of the Model 100.

Elf-Writer is a formatting utility for text processors. Featuring a view mode, it allows the user to see the document being formatted before it's printed. Formatting is accomplished by embedding commands within your text — commands such as headings and footings, variable margins, and variable line spacing. "Elf-Writer provides the printing power of a word processor with a full line of features," according to Ceres.

Elf1 + 1 turns your computer into an easy-to-use-calculator. The user presses the keys in the same order in which the mathematical problem would be written or thought through. Features include an entry display, a running total display, and a memory display. Special functions are square root, percent, exponent, and change sign key. (Normal calculator functions are supported also.) Elf1 + 1 uses the 100's 10 key pad for entry. By assigning the special function keys to characters around the numbers, entry of calculations is easier. An image of the calculator keys always is displayed for your reference.

Elf-Cop is a utility that manages your file space problems. The software backs up all of your files or specified files at one time. RAM files may be backed up to any device and backups to cassette will automatically be done twice. To assist in tracking your backups, an archival report is produced. Elf-Cop also reports file sizes and provides copy, rename, and delete functions.

Elf-Banker performs specific banking and financial calculations. Ceres claims you don't have to be an accountant to use it. When you have extra money to play with, it evaluates how to

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44 Programs for the TRS-80 Model 100 Portable Computer, by Jim Cole, practical programs to make lap-sized portable do real work immediately, ideal for business, home, 96 pages.
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use it, getting the highest return. Need a loan? It tells you what it will cost you before you go to the bank. Each module prompts for the necessary information, then performs the calculations. Calculations include lease vs. buy analysis, mortgage payments, compound interest, present value, and 16 others.

The Elf software is priced at \$24.99. For more information, contact Mona Helfgott, Ceres Software Inc., P.O. Box 1629, Portland, Oregon 97207, 503-245-9011.

AMERICAN MICRO OFFERS SPREADSHEET, FORTH, CALCULATOR

Like Ceres Inc., American Micro Products Inc. also hopes to address the demand for software for Model 100 users. The Texas-based company has introduced eight new software packages, with an electronic spreadsheet heading the list.

The T Plan/N Plan, which handles as many as 96 rows and 26 columns, lets users make financial projections, play "what if" scenarios and construct financial models.

In addition to T Plan/N Plan, other new business-oriented products include Portfolio Analysis and Income Property Analysis. The former evaluates stock portfolios, calculating portfolio value, yield of portfolio, and dividend yield. Data can be entered manually or tapped automatically from Dow Jones public data-base.

The latter calculates pre- and post-tax investment potential of income

properties. A summary of the property's performance and overall equity yield is determined and annualized.

The scientific and engineering programs being offered include statistical curve fitting, histogram and plot, equation solver, RPN calculator, and the Forth programming language.

Statistical Curve Fitting calculates and plots linear, power, exponential, and logarithmic regression analysis curves. Histogram and Plot calculates histograms, displaying as many as 10 bars at a time. Equation Solver performs as an AOS/TM-calculator, emulating Texas Instruments-type algebraic logic. RPN Calculator is a software module that, once installed, gives the computer all the abilities of a hand-held calculator. The Fourth package provides the ability to perform assembly-like programming in Forth-79 Standard. Programs written in Forth will execute much faster than Basic programs, particularly in graphics and other I/O-intensive applications.

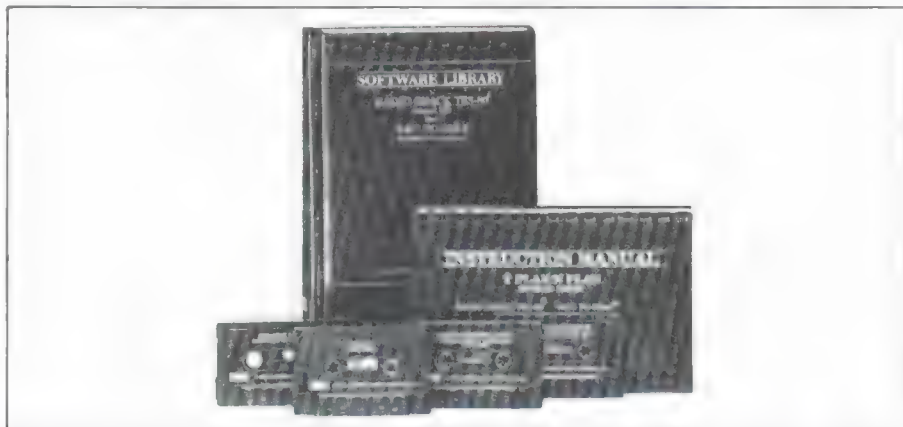
American Micro Products, Inc. is headquartered at 705 North Bowser, Richardson, TX 75081, 214-238-1815.

LAPCOM BRIDGES COMMUNICATIONS GAP BETWEEN TELCOM, BASIC

Now you can execute Basic commands and view local files while retaining communications between your 100 and host computer.

The LAPCOM program, introduced by PocketInfo Corp., supplants TELCOM in the Model 100. By utilizing menus and function keys for quick access, the file directory can be displayed, Basic can be accessed for immediate commands, the computer's time can be shown, and XOFF, XON, and CTRL commands can be sent with a single keystroke ... all without disconnecting the phone. It is possible to simultaneously display, store, and print text data while it is being downloaded.

LAPCOM sells for \$39.95 on tape cassette with comprehensive user manual. Write or phone PocketInfo Corp., PO Box 152, Beaverton, OR 97075, 503-649-8145.



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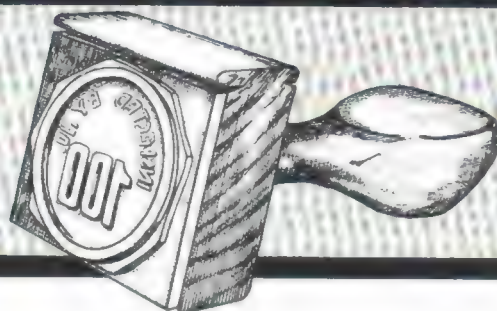
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REVIEWS



THREE WORD PROCESSORS FOR THE 100 REVIEWED

By DAN SHAFER

Perhaps the most common use of the Model 100 is writing — from notes, memos, and lists, to reports and magazine articles. Everything gets stuffed into the Model 100's ever-ready memory for instant recall. The question is, recall how? On what device? In what format?

As good as the Model 100 is, it clearly is not a word processor. To be sure, the machine as Tandy delivers it is capable of printing a document with control over its line length, but that's all the 100 can do. There are no page breaks or page numbering; no automatic centering of text; no underlining; no justification; no headers or footers; no ability to print selected portions of text; no pause for paper change to permit letterhead printing; and no special indentations.

To a professional writer like myself, these shortcomings were apparent during my first hours of using the 100. As far as I could ascertain, there were no word processors available for the system, so I set out to write one.

But I dropped the idea when I found out about one... then two... then three word-processing programs available commercially over CompuServe.

When I had the opportunity to evaluate several word processors, I couldn't resist. I spent most of my pre-computer career as a journalist, and I've always enjoyed writing. Besides, I wanted to evaluate word processors for my own use on the 100, so this gave me a perfect excuse.

I ended up taking a close look at three word-processing programs: Print from Micro Computer Services of Portland,

OR; Write+ from Portable Computer Support Group of Dallas, TX; and Tortugawriter, marketed by the author via CompuServe.

STARTING AT THE CONCLUSION. Because once a journalist, always a journalist, I'm inclined to put the important stuff up front and follow with the nitty-gritty details. So, let me say at the beginning I found all three programs acceptable. The one you should consider buying depends on your needs

and your pocketbook more than differences in the programs.

From a price-performance standpoint, I felt Write+ offered the best value, but that may change. Dave Hansen of Micro Computer Services told me there's a plan to cut Print's price to \$39.95, making price-performance a toss-up between the two programs. Tortugawriter is the least expensive and offers an adequate solution — if your needs are minimal.

Table 1 is a feature-by-feature comparison of the three products. If you

	PRINT	WRITE +	TORTUGA
Output Control	Yes	Yes	No
Easy File Select	Yes	No	No
Auto-Off for Unattended Print	Yes	No	No
Centering	Yes	Yes	Yes
Full Margin Control	Yes	Yes	Yes
Justification	Yes	Yes	Yes
Double-Spacing	Yes	Yes	Yes
Triple+ Spacing	No	Yes	Yes
Multi-Column	Yes	No	No
Imbedded Comments	Yes	No	No
Dynamic Output Destination	Yes	No	No
Date Inclusion with Variable	Yes(1)	Yes(2)	No
Headers	Yes	Yes	Yes
Footers	No	Yes	No
Page # Position Control	No	Yes(3)	No
Invoking Printer Features	No(4)	Yes(5)	Yes(6)
Print Selected Part of File	No	Yes	No
Multiple Copies	No	Yes	No
Easy to Create Blank Space for Tables, etc.	No	Yes	No
Conditional Page Breaks	No	Yes	No
Variable Tabs	No	No	Yes

NOTES:

- (1) Date can be inserted anywhere in the document.
- (2) Date may be anywhere in a header or footer only.
- (3) Page # must be placed in a header or a footer.
- (4) May be possible using undocumented >LS command.
- (5) Printer commands can be document-specific or global (i.e., used for all documents), but latter function may not be operational.
- (6) Permits embedded printer control using standard calls (U+ and U- for Underline, etc.).

Table 1. Word Processors Compared by Features.

The notebook your parents used didn't do much. At best, it just lay on a desk, a repository for a lot of more-or-less legible handwriting.

NEC's PC-8200 portable computer is a notebook, too. Except it's got big-computer memory and big-computer power—all in a battery-powered 4 lb. package for under \$800. You get a big 40-character/8-line screen. Plus NEC gives you 14 free software packages to start, including an investment portfolio and word processor.

You can use the PC-8200 to take fast, legible notes in class, perform calculations, solve difficult math and science problems, and for virtually anything else you used to do by hand. With optional graphics, you can even doodle. And with the optional printer, you can get rid of your clunky portable typewriter.

The CMOS-based PC-8200 is the best portable computer you can buy, and at the best price. See it at your NEC dealer before you buy all your school supplies.

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	NEC PC-8200	Radio Shack Model 100	Hewlett- Packard HP-75
Price	\$799*	\$799	\$995
RAM/ROM	16K/32K	8K/32K	16K/48K
RAM Expandability (Internal/External)	To 96K (64K/32K)	To 32K (32K/none)	To 24K (24K/none)
Free bundled software	Yes	No	No
Function keys	10	8	0
RAM cartridges	Yes	No	No
Bar Code Reader, RS232, Parallel Port, Cassette Port	Yes	Yes	Not Standard
Floppy Disk and SIO Port, Cursor Cluster	Yes	No	Not Standard

*Includes perpetual clock calendar. NiCad battery pack, AC adapter charger optional

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have a good idea what your word-processing needs are, it should give you all the information you need to make a purchase decision.

Table 2 is my report card on the programs. You should note this evaluation is based on my word-processing needs, which I suspect are typical of most professional writers. If you don't fall into that category, the report card may be less useful to you.

Table 3 gives you the vital statistics on the word processors reviewed in this article and on some other word crunchers available for the 100.

With those preliminaries out of the way, let's take a closer look at the word processors:

TORTUGAWRITER. I reviewed Version 1.0, dated September 1983.

This is a basic word processor with essential word-processing features (centering, justification, margin control, variable line spacing, and single-page printing), but not a lot beyond that. It also permits you to invoke special features on your particular printer (type font changes, condensed type, etc.). Except for imbedded codes for underlining, Tortugawriter requires that you know your printer's control codes (for an explanation of control codes, see *Portable 100*, November 1983, page 40). The program is relatively easy to use, partly because it doesn't have a confusing array of features and multiple mnemonic commands.

A good example is the margin command used to set the left, right, top, bottom, and special margins by adding a letter (ML=left margin, MT=top margin, etc.). Similarly, the L(ength) command can be combined with a letter to set line length (LL), tab positions (LT), and page length (LP).

One disadvantage I found in the product, though, was the designer's choice of left and right braces as command delimiters. To enter these commands requires holding down the graph and parenthesis keys (9 and 0). I found myself having to think about this rather than automatically using them. This can be an advantage (it avoids accidental invocation of a command) but can also be cumbersome.

Another serious shortcoming in Tortugawriter for my use — and, I suspect, for many word-processing ap-

plications — is the inability to print footers on each page. Headers, however, are permitted.

On the positive side, Tortugawriter is the only word processor I studied which allowed setting variable tabs.

For \$15 (the price may be different; I haven't been able to reach the designer during my work on this review), Tortugawriter is an adequate solution for limited word-processing needs.

PRINT. This program (to my knowledge, a relative newcomer) has some excellent features and is very well thought out. I reviewed version 2.0 of the program.

Some things I found intriguing about Print were the following:

- Easy selection of a file to be printed;
- "Spooling" of sorts, accomplished by outputting the document through

Print to a RAM file and printed later;

- Using the shift-print command in TEXT;
- Multiple-column output capability (assuming your printer can reverse line feed), a feature my WordStar program at 30 times the price will not allow; and
- Inclusion of the current date anywhere in the document (a feature very useful in draft dating and in form letter runs).

On the negative side, Print doesn't permit you to toggle special features on your printer. (Unless it's possible using the >LS command. If so, that command is undocumented in the current version of the Print manual, although it was penciled in by the man-

	PRINT	WRITE +	TORTUGA
Power	B	A	C
Flexibility	B+	A-	B
Ease of Use	B	B	B+
Documentation	B-	B+	D
Support	A	A	NA
Total Price-Performance	B	A-	C

Table 2. Author's Rating of Word-Processing Products.

Write + 2.0 (1)

Portable Computer Support Group
11035 Harry Hines Blvd.
No. 207
Dallas, TX 75229
214-351-0564
\$59.95 (2)

Print

Micro Computer Services
P.O. Box 17586
Portland, OR 97217
503-285-7424
\$49.95 (2)

PortaPrint (3)

Skyline Marketing Corporation
4510 W. Irving Park Rd.
Chicago, IL 60641
312-286-0762
\$44.95

The Travelling Writer

Travelling Software Inc.
11050 Fifth Ave. NE
Seattle, WA 98125
206-367-8090
\$49.95

Scribe 3.0

Chattanooga Systems Associates
Post Office Box 22261
Chattanooga, TN 37422
615-875-8656
\$29.50

Elf-Writer

Ceres Software Inc.
4303 S.W. Chesapeake Ave.
Portland, OR 97201
503-245-9011
\$24.99

- (1) Version 1.3 reviewed in *Portable 100*, September 1983, page 54. this article.
(2) Word processor reviewed in November 1983, page 56. (3) Reviewed in *Portable 100*, November 1983, page 56.

Table 3. Word Processors for the Model 100.



DATAACCOUNT

Unique software to make your lap-sized portable the equal of any desk-top microcomputer.

Professional and personal management programs designed for Tandy Model 100, NEC PC-8201, and Olivetti computers.

Dataaccount's proprietary algorithms in assembly language give your computer virtual random access memory, accessing any record in less than a second, even in a 32K byte file. Other features include variable length fields, searching and sorting capabilities, with no memory overhead.

Now available from NEC dealers are four new programs by Dataaccount; tax preparation, tax planning, timekeeping, and real estate analysis.

Applications now in use include:

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ufacturer in the sample program sent to me for evaluation.)

An interesting feature I didn't find a use for is the program's ability to change the output device for the file dynamically. This permits sending a message to the screen during printing and then routing the rest of the document back to the printer.

At \$49.95, Print is a fair buy. At the reduced price of \$39.95, it offers a strong alternative to the Portable Computer Support Group's Write+, undoubtedly, in my opinion, the most popular word processor for the 100.

WRITE+. This is easily the best known word processor for the Model 100. In fact, it was the first one I bought after I decided I needed such a product. I purchased version 1.3, but for this review, I was loaned a copy of version 2.1, which cleans up some of the shortcomings in the earlier release. (Version 1.3 was reviewed in *Portable 100*, September 1983, page 54).

For my use, this product is slightly better than Print. Features I find useful include:

- Printing a page from a document without printing the entire document (I frequently change data on a single page of a 10- or 12-page report and need this feature);
- Creating blank space for the later inclusion of tables and figures with a single command (other word processors will permit this with multiple carriage returns, but it's a real guess and cumbersome to change later);
- Printing multiple copies of the document without reinvoking the word processor for each copy. (I frequently need to print two or three copies of a short memo to avoid having to go to the copy machine before distributing it.);
- Page footers; and
- Variable page number positioning using the header or footer feature. (Other word processors put the page number where they want or only permit it in headers).

Invoking special printer features is very straight-forward with Write+, although I continually had difficulty

with "global" printer commands (contained in the format file called W+SPEC.DO) not executing. If I put the command in the document file, it worked fine, but in the file which the program uses, it never worked right. This would only be a problem if the global printer feature was one a user wanted to use in all documents. (I must allow for the possibility that its failure to work was caused by something I did wrong.)

I confirmed one flaw in the documentation of Write+. Abandoning print in the middle causes the program to break and you must start from scratch. This is contrary to the documentation.

DOCUMENTATION. Before closing, I'd like to comment briefly on the documentation included with these programs. The manual for Write+ was easy to follow, well-designed, and thorough. It had a few errors, and although they weren't serious, they were disturbing until you figured them out. The quality of the writing was average. Overall, the manual is the best of the three word processors'.

Print's documentation is a distant second. Other than the fact there were undocumented commands (notably the >LS command), it was a bit too sketchy, didn't provide examples to figure out what's going on, and offered no tutorial — only a reference manual.

Tortugawriter's "documentation" was three photocopied pages — decipherable... if you felt like trying. Hopefully, the designer will upgrade this manual with later releases (as he promises in the manual when he downloads the program to you on CompuServe).

A FINAL COMPLAINT. None of these word processors permits hanging indentation (a feature where all but the first line in a paragraph are indented a number of spaces). For lists of features, steps, etc., this is essential.

Write+ simulates such a feature. It flags an item with a letter or number followed by a carriage return. The result is unprofessional and not acceptable. There may be some excellent reason for excluding this feature, but I'd sure like to see someone produce a word processor for the Model 100 with that ability.

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(24K) ~~\$44.95~~ \$39.95 ea.
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~~\$44.95~~ \$42.70 ea.
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Portable Computer Support Group

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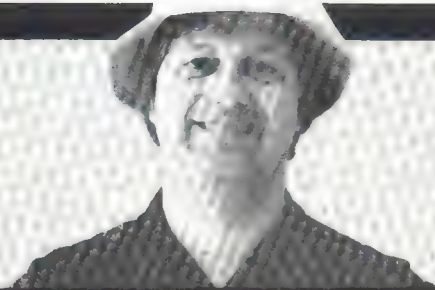
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Editor's Note: Full-Duplex is dedicated to solving reader's Model 100 problems. Readers needing assistance should address their letters to: Terry Kepner, c/o Portable 100, 67 Elm St., Camden, ME 04843.

CONTROL CODES FOR TEXT HAVE THIS READER PUZZLED

I have a Model 100 and Radio Shack DMP-120 printer. Page 60 of the Model 100 manual says, "Control P will allow you to 'embed' printer codes (for boldface, underlining, etc.) in a TEXT file." Then the paragraph goes on to explain how to underline. My question is, how do you boldface, etc., with control-P and codes embedded? If you are in TEXT and do a control-N, you go into the find function.

Lyndon Mitchell
Waipahu, HI

First, you must use the control-P command with every control code you want embedded in your text. Specifically, you would type a < caret > -P < caret > -X to embed the control-X command in your text, which would appear on your display as < caret > -X. The control-P command tells the print routine in TEXT to send the next control character as an ASCII value less than 32, instead of printing < caret > -X. If you have a series of control codes you want sent to your printer, each individual control code must be preceded by a control-P. Note that the control-P is not printed on the display, unless you press it twice!

DESIRE FOR MORE MODEL 100 TECHNICAL SOFTWARE

Has anybody dreamed up software to convert the Model 100 asyn-

chronous ASCII protocol to the bisynchronous protocol without buying an \$1800 protocol converter? Many IBM word processors use such systems. Is it technically possible, before the advent of a Model 100 disk drive, to create software allowing the Model 100 to do legal research through the Westlaw or LEXIS systems? If so, has it been done and who is selling it?

Douglas Roberts
Miami, FL

To the best of my knowledge, the answer to both your questions is no. Sorry. If anything turns up, I'll put an information update in this column.

MORE PROBLEMS WITH CONTROL CODES IN EMBEDDED TEXT

I'm having two problems with my Model 100. First, I can't get the line statement (page 152 of the manual) to work right. When I run:

```
10 LINE(20,20)-(50,63)
20 LINE - (30,30))
```

all I get is a lightening flash of the two close lines in the lower right corner of my screen on RUN. Also, with:

```
10 LINE (0,0)-(239,63),1,B
```

the box flashes on the screen for a second, and I only can hold it with the pause button. Is this normal?

Secondly, I'm having problems with the embedded commands using the control-P (page 60 of the manual). I don't know if the problem is me or my Transtar 120 printer. I get the < caret > -P sign before the printer code command, but the printer ignores any-

thing following it and simply prints the code letter.

I also can't seem to get the escape command to the printer. I tried pressing the ESC key followed by the appropriate code letter, and all I got was the printed code letter. I tried CHR\$(27) and then the printer worked.

Lee Steffens
Lihue, HI

Your mistake is the method you're using to embed the control codes. The control-P command is used to tell the computer that the next key stroke is a control code with an ASCII value below 32. If you see < caret > -P printed on your display, then you've pressed the control-P key twice. See the previous letter in this column for more information about that.

The ESC key is a duplicate key for control-left bracket, except that it can only input the ASCII value 27. If you want to embed the escape command (ASCII 27) in your text, press control-P, then press the ESC key. The < caret > -] will appear just as if you had pressed control-P and then control-].

EMBEDDING CHR\$(0) WHEN PRINTING TEXT

The trick to embedding a CHR\$(0) in TEXT on the Model 100 involves graph-p (ASCII decimal 128) and setting up your printer so the eighth bit is always zero! This works on both the Epson and Gemini printers.

On the Gemini printer, send a control [= to tell it the eighth is always a zero (dip switch 3 has to be on). Now just use your control codes to initiate the formats you want. When you want to turn them off, send a control-[(CHR\$(27)) and then graph-p. The graph-p displays as a telephone symbol, but doesn't print since the printer

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```

S O P * + @ i s # z ~ + / +
R A $ * * * * * + + + + + + +
      E
    *
  
```

```

r - 1 + F I L J + + + + +
  
```

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ignores the eighth bit and accepts the other seven as an ASCII 0, turning off the print format currently in use.

Bill Templeton
Danville, CA

Thanks for the tip.

DOCTOR WANTS CURE TO FIX 100-APPLE INTERFACE ILL

I'm a doctor and would like to use the Model 100 in my office so I can record patient data as I do the examination. So far, I have been recording the information on my Apple computer after it is written on paper forms. My goal is to be able to punch "Y/N" and type in the exam results during the examination, then send the file to the Apple. My problem is I don't understand how the Model 100 can be made to work with the Apple. If I can hook it up, which word-processing or data-base programs would be compatible? What do I do?

Richard Fulroth
Salinas, CA

There are many different options. It seems that there're three different RS232 boards available for the Apple

computer, each having different capabilities and restrictions (see page 32). One board is set up to work with a remote terminal (DTR), which doesn't require the use of a null modem. The second is designed for Data Communications Equipment (DCE), such as a modem, and requires a null modem when connected directly to another computer. The third has a switch that lets you select which mode you want to use, DCE or DTR.

Once you have the two computers communicating, you have two more choices: using the Model 100 as a remote control device for the Apple computer or using it as a temporary data storage device for sending data later to the Apple.

To control the Apple via remote control, just set the keyboard input and video monitor output ports to the RS232 device. Now whatever is typed on the Model 100 (in TELCOM mode, of course) is accepted by the Apple as if it were typed on the Apple's keyboard; everything sent to the Apple monitor is routed out to the Model 100 instead. This method lets you actually run Apple programs from the Model 100. As far as the program is concerned, you're typing on the Apple, not the Model 100. The program selection is entirely up to you.

The limit to this method is distance. Direct connection of the two computers is limited to a distance of 50 feet, unless you put an RS232 amplifier in the cable. If you use an amplifier, its power rating will determine the distance you can use between the two computers.

Using the Model 100 as a temporary storage device gives you two more options: using a Basic program to input and store the information or using TEXT for that purpose. As long as the data is stored in the proper sequence and format (determined by the software used on the Apple), you won't have any problems.

For a program, just make a series of INPUT statements that duplicate the questions used in your Apple program, storing the answers in RAM. Later, you can transfer this data to your Apple. If you're using a data-base management program, you'll have to transfer the information to the Apple using the technique I mentioned above, making the Apple accept input from the Model 100 as if it were coming from the keyboard. The upload feature of TELCOM should work with this method. If you just want to store the data file on the Apple, then a simple terminal program on the Apple can receive and store it for you. Good luck. 🍀

Advertisers' Index

PG RS# ADVERTISER

45	33	Alpine Data System
3-2	1	American Micro
12	10	American Micro
39	31	American Tourist
23	20	Andreasen
68	56	Arcsoft
21	19	Atlantic NE Marketing
13	11	Avior
65	54	Bluestem
66	57	BRS
27	23	Ceres
75	61	Chattanooga Choo Choo
59	47	Chattanooga Systems
62	51	Coastal Office
55	42	Complete Computer
30	26	Consultant Services
62	52	Custom Software
73	59	Dataaccount
25	22	Dataaccount
57	43	Datamasters
31	27	DFW
69	57	Diskus
60	49	Excor
74	60	EV5
77	62	Fidelity
17	13	Ft Worth
55	41	Ft Worth
17	14	Gnflth
37	30	Gunther International
1	2	Holmes
51	43	IG
47	35	Joe The Bag
9	7	Q Tech

PG RS# ADVERTISER

18	15	IRD
49	37	Kangaroo
18	16	Key Solutions
58	44	KJM Development
58	45	Menlo
11	8	Micro Bill
29	24	Micro Byte
61	50	Micro Demon
71	58	NEC
79	63	Newsnet
12	9	PG Design
47	34	PG Design
19	17	Pocket Programs
4 C	66	PC Support Group
5	4	PC Support Group
52	39	PC Support Group
53	39	PC Support Group
63	53	PC Support Group
80	64	PC Support Group
48	36	Purple Computing
40	32	Radio Shack
41	32	Radio Shack
34	29	Silverware
15	12	Skyline Marketing
3	3	Skyline Marketing
19	18	Solitary Software
6	5	Source
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54	40	Susie Software
3 C	65	Traveling Software
7	6	Traveling Software
61	48	Traveling Software
30	25	York Software

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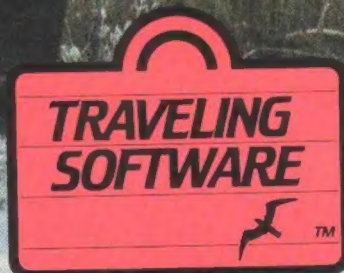
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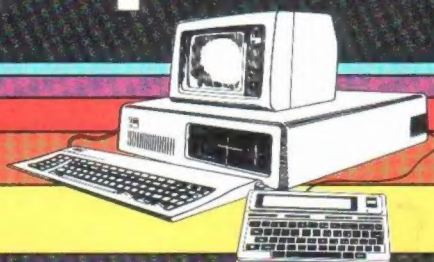
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